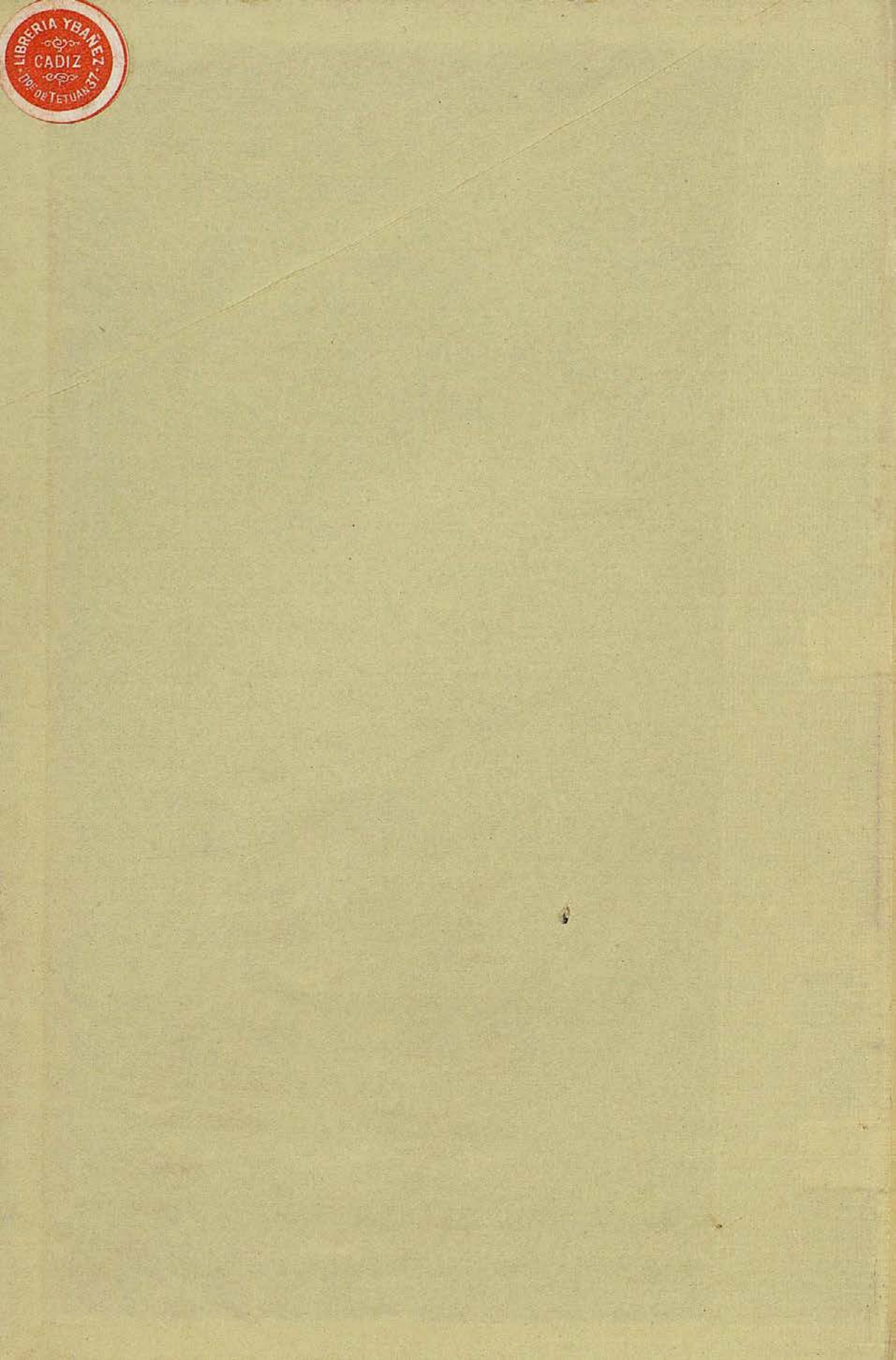
THE NAVAL ANNUAL

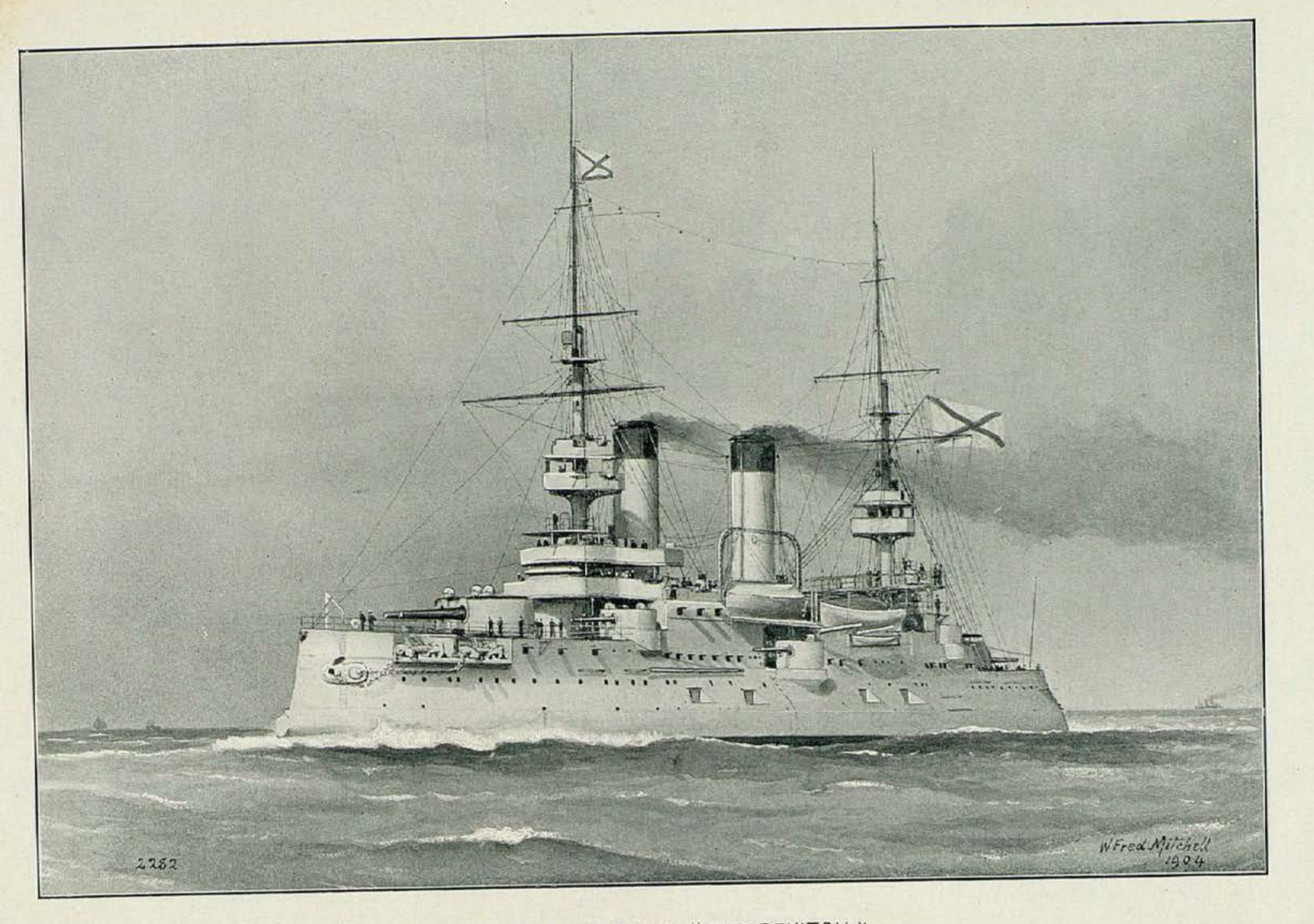
Edited by T. A. BRASSEY

1904

EIGHTEENTH YEAR OF PUBLICATION

J. GRIFFIN & Co. PORTSMOUTH





RUSSIAN BATTLESHIP "CESAREVITCH."

(Torpedoed at Port Arthur.)

THE

NAVAL ANNUAL,

1904.

EDITED BY

T. A. BRASSEY, A.I.N.A.

PART I.—Sir William White, K.C.B.; Messrs. Carlyon Bellairs, G. R. Dunell, John Leyland, and J. R. Thursfield.

PART II.—List of Ships: Commander C. N. Robinson, R.N., and John Leyland; Plates: S. W. Barnaby.

PART III.—Submarines; Armour; Ordnance and Ordnance Tables.

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PREFACE.

The publication of the present volume has been delayed in order to include an article on the Japanese Navy, which will be of great interest at the present juncture. No attempt has been made to deal with the Russo-Japanese War, as sufficient information is not yet available as to what has taken place to enable the subject to be effectively treated. To avoid confusion, the whole of the Russian ships at Port Arthur at the outset of the war are included in the Russian battleship strength given in the tables. Owing to the large amount of information as to the progress of the Navy now given in the First Lord's Memorandum and the Statement of Work, the report of trials and descriptions of new ships have been embodied in the same chapter with the record of the progress of foreign Navies. In Part II. it has been decided to substitute English tons for metric tons throughout the tables. In previous years we have given the English tonnages in the Comparative Tables only. Part III. contains an interesting chapter on Submarines, in addition to the usual chapters dealing with Armour and Ordnance.

In the preparation of a volume embodying such large masses of statistics there must be occasional errors and slips. The Editor has to thank more than one correspondent for pointing out errors in past volumes, so as to enable him to prevent their repetition in the present issue. He would be only too grateful if any readers of the present volume would take similar trouble. Mr. Carlyon Bellairs, this year, as last, has assisted in the work of editing. To the Admiralty we are indebted for kindly furnishing us with drawings of the battleships and cruisers now under construction.

In the last number of the *Naval Annual*, as on previous occasions, we pleaded for some limitation in the growth of naval expenditure, and we pointed out certain directions in which we believed it was possible to economise. The suggestions made were severely criticised by some of our reviewers. They were made in what, rightly or wrongly, we believed to be the best interests of the country, and in more than one instance they have been justified by the actions of those responsible for the administration of the Navy.

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PART I.

CHAPTER I.

Progress of Navies.

Great Britain.

The Navy Estimates for 1904–5 amount to £36,889,500, as compared with £34,457,500 in 1903–4. The principal increases are in shipbuilding, armaments, and *personnel* funds. The increase of expenditure on shipbuilding and repairs amounts to over one million pounds, on naval armaments to £439,900, and on wages, victualling and clothing to £513,700. There is an increase of £107,000 in the vote for Naval Reserves.

Personnel. The total numbers voted for the Navy are 131,100 under Vote A, and 60,011 in the Reserves. There is a net increase of 4000 men in the permanent force, but while there is an increase in the numbers of officers, seamen and marines, there is a decrease of 300 in the number of boys on sea service and of 840 in the number of boys under training. These decreases seem to indicate that a limit to the continuous expansion of the permanent force has at last been reached.

Reserves. The increase in the Reserves of nearly 13,000 men is satisfactory. It includes increases of 2300 in the Fleet Reserve, and 250 officers and 3000 men in the Naval Reserve. In the Colonial Naval Reserve 600 men are voted for Newfoundland, 400 for Malta, and 700 for Australasia. The number proposed for the Royal Naval Volunteers is 6500. Recruiting has proceeded well in the London and Glasgow districts, and it is possible that this number may be reached by the end of the year.

Battleships completed. The remaining ships of the Duncan class have been completed, and are now in commission.

Ships purchased. The battleships Constitucion and Libertad, built at Elswick and Barrow respectively for the Chilian Government, have been acquired by H.M. Government for £1,875,000, and re-named the Swiftsure and Triumph. In the following table is given a comparison of their

principal features with those of other battleships just completed or completing for our own and Foreign Navies:

	Swiftsure and Triumph.	Duncan.	Suffren.	Braunschweig.	Margherita.	Cesarevitch.
Length	436 ft.	405 ft.	412 ft.	398 ft. 6 in.	426 ft. 6 in.	389 ft.
Beam	71 ft.	75 ft. 6 in.	70 ft.	73 ft. 6 in.	78 ft. 3 in.	76 ft. 3 in.
Displacement (tons)	11,800	14,000	12,527	12,997	13,214	12,912
I.H.P.	13 000	18,000	16,500	16,000	19,000	16,300
Speed (knots) . .	20	19	18	18	19·5 in.	18
Protection:						
Belt	7–3 in.	7 in.	12–8 in.	9–4 in.	6 in.	10–4 in.
Deck.	3 in.	—	2¾ in.	3 in.	3 in.	2½ in.
Side	7 in.	7 in.	5–3 in.	6 in.	6 in.	6 in.
Heavy Guns . .	10–8 in.	11–6 in	12 in.	10–6 in.	8 in.	10–11 in.
Secondary Guns .	7 in.	6 in.	6–5 in.	5½ in.	6 in.	6¾ in.
Armament . . .	4 10-in., 14 7·5-in., 14 14-pdrs.	4 12-in. 12 6-in. 12 12-pdrs.	4 12-in. 10 6·4-in. 8 3·9-in.	4 11-in. 14 6·7-in. 12 3·4-in.	4 12-in. 4 8-in. 12 6-in. 16 12-pdrs.	4 12-in. 12 6-in. 20 12 pdrs.
Coal	2000 tons	2000 tons	1820 tons	1800 tons	2000 tons	1350 tons

Distribution of armour. In the important feature of protection, the Swiftsure and Triumph do not compare unfavourably with the Duncan class. The waterline belt in the Swiftsure tapers to 3 in. at either end, in the Duncan class it is not continued abaft the after turret, in the Braunschweig and Cesarevitch it tapers to 4 in. In the Suffren, as in most French designs, special attention is given to the protection of the waterline. The maximum thickness of the Swiftsure's belt is less than that of the French, German or Russian ships in the table; on the other hand, the side armour is carried up to the upper deck for the whole length of the battery, as it is also in the Braunschweig and Margherita. The secondary armament is mounted on what is known as the concentrated casemate system, first adopted in the Japanese battleship Mikasa, built at Barrow, and embodied in the design of the King Edward VII class. As in the Mikasa, the 7·5-in. gun-positions within the citadel are separated by longitudinal and transverse armoured screens. That the system of protection adopted in the Mikasa presented important advantages over the casemate system of British battleships was suggested in an article published in the *Naval Annual* in 1896.

Armament. For main armament the Swiftsure and Triumph carry four 10-in. guns in place of the 12-in. guns of most first-class battleships. Is this a serious objection? Admiral Sir John Hopkins remarks in a letter to the *Times:* "The developed 10-in. gun, which forms the main armament of the Chilians, has now practically power enough for anything, and need not be looked upon as a disqualification for any battleship." If the principal armament is inferior, the secondary armament of 14 7·5-in. guns, each firing 200 lb. shell at the

rate of eight per minute, is immensely superior to the 12 6-in. guns of the Duncans and Cesarevitch and the ten 6·4-in. guns of the Suffren. According to *Engineering*, the weight of projectiles that can be fired per minute is 13·5 tons, as compared with 8·9 tons in the case of the Duncan; while the muzzle energy is 1,705,249 foot-tons, as compared with 984,365 foot-tons.

The following description of the gun trials of the Libertad (Triumph) is extracted from the *Times:* Gun trials.

On the gun trials the 7·5-in. guns, using 200 lb. shot, attained a rapidity of fire of eight rounds per minute, and no difficulty was experienced in maintaining this high rate of firing. Several of the 7·5-in. guns were fired simultaneously, and the 10-in. guns were fired simultaneously and independently on various bearings to ascertain if any stress resulted to the structure of the ship; but a careful examination did not reveal even the breaking of light electric fittings. The 10-in. guns fire a projectile of 500 lb. weight, with a muzzle velocity of 2850 ft. per second, using nitro-cellulose charges, while the rate is slightly less for cordite. All the operations of the 10-in. guns are by hydraulic plant, the breech mechanism having an independent yet simple hydraulic device for opening and closing. The projectiles are raised from the magazine and rammed home in the guns, and the guns are trained and elevated by hydraulic machinery. At the same time all these operations can, if necessary, be carried out by hand gear. In the case of the 7·5-in. guns on the broadside, a new system of hydraulic machinery has been introduced for housing the guns, and this can be done in a few seconds, the guns being thus protected during heavy weather.

The designed I.H.P. is far smaller in the Triumph than in the other ships, yet on the full-power trial of six hours' duration the mean speed of six runs over the measured mile was 20·17 knots, with 14,105 I.H.P. and a coal consumption of 1·73 lb. per I.H.P. per hour. The speed maintained for six hours was 20·12 knots. In speed the purchased ships are a knot faster than the Duncans, most of which did less than 19 knots on their trials, and two knots faster than the latest French, German, and Russian battleships. The Italians in the Margherita, as in most of their battleships, have sacrificed defensive qualities to speed and offensive power. The coal capacity is equal to that of any battleship, and would enable the ships to steam 12,000 miles at 10 knots, or 4000 miles at 19 knots. Speed trials.

The Swiftsure and Triumph are valuable additions to the British Navy, where in speed and offensive power they have as yet no equals. They carry their broadside guns as high above the waterline as the Duncans, and their freeboard forward is only 1 ft. less. The Swiftsure was sent to Chatham to be docked before her trials. There is no reason for believing that her scantlings are too light. In defensive qualities—and it is from this point of view that they are most open to criticism—the ships are certainly fit to take their place in the line of battle.

Formidable class.

The following is the result of the trials of the last two ships of the Formidable class:

	Makers of Machinery.	At One-Fifth Power.			At Four-Fifths Power.			Full Power.		
		Speed.	I.H.P.	Coal.	Speed.	I.H.P.	Coal.	Speed.	I.H.P.	Coal.
		knots.		lbs.	knots.		lbs.	knots.		lbs.
Queen . .	Harland & Wolff	11·6	3058	1·84	16.97	11,670	1·61	18·39	15,556	1·76
Prince of Wales . .	Greenock F'dry .	10·45	3128	2·21	17·04	11,669	2·08	—	15,364	2·02

The Queen is fitted with Babcock & Wilcox boilers; the Prince of Wales with Belleville boilers.

King Edward VII class.

Of the King Edward VII class, the King Edward was launched at Devonport on July 23; the Commonwealth, on May 13, at Fairfield; the Dominion, on August 25, at Barrow; the Hindustan, on December 19, at Clydebank; and the New Zealand at Portsmouth in February, 1904. The King Edward, Dominion, and Commonwealth will have four-fifths Babcock & Wilcox boilers; the Hindustan four-fifths Niclausse boilers. There has been some criticism of the decision of the Admiralty to adhere to the design of the Edward VII for the three battleships Africa, Britannia, and Hibernia, which have just been commenced—the 6-in. gun being considered to be out of date for the secondary armament.

Cruisers. Euryalus.

The Euryalus, the remaining cruiser of the Cressy class, 12,000 tons displacement, has passed through her trials. Her completion has been delayed by a series of accidents. She attained a speed of 21·635, with 21,318 I.H.P.

Drake class.

The remaining ships of the Drake class, the Leviathan and King Alfred, have been commissioned.

Kent class.

The following particulars of the trials of the Kent class (9800 tons) are taken from *Engineering*. The Bedford, Berwick, Donegal, Monmouth, and Kent are in commission:

	Makers of Machinery.	Boilers.	At One-Fifth Power.			At Four-Fifths Power.			At Full Power.		
			Speed.	I.H.P.	Coal.	Speed.	I.H.P.	Coal.	Speed.	I.H.P.	Coal.
			Knots.		lbs.	Knots.		lbs.	Knots.		lbs.
Bedford .	Fairfield .	...	14·92	4522	1·91	21·2	16,005	1·97	22·7	24,457	2·12
Berwick .	Humphrys .	N	14·59	4671	1·75	21·64	16,622	1·78	23·61	22,681	1·91
Cumberland	London and Glasgow .	...	15·4	4930	2·1	22·13	16,472	1·98	23·68	22,784	2·01
Donegal. .	Fairfield .	B	14·75	4678	2·07	22·35	16,350	2·07	23·568	22,173	2·16
Essex . .	Brown . .	B	14·04	4642	2·03	19·97	16,132	2·17	22·79	22,219	2·22
Kent . .	Hawthorn .	...	14·6	4632	1·81	20·45	16,209	1·83	21·7	22,249	1·89
Lancaster .	,,	B	13·43	4643	2·1	22·03	16,044	2·16	24·01	22,881	1·94
Monmouth.	London and Glasgow .	B	15·67	4711	1·83	20·49	16,326	1·45	22·58	22,189	1·97
Suffolk . .	Humphrys .	N	14·4	4954	1·89	21·2	16,350	1·89	24·7	22,645	2·2

Devonshire class.

Of the Devonshire class, 10,850 tons, the Antrim, Argyll, and Carnarvon have been launched. It has been decided to modify the armament, as shown in the plate in Part II. Instead of four 6-in. guns in double-storeyed casemates on either bow, two 7·5-in. guns will be mounted on the upper deck. It has been found in our new cruisers, more especially in the Kent class, that it would be difficult to fight the forward main-deck guns in a sea way.

Sloops.

The Cadmus and Clio, 1070 tons displacement, attained speeds of 13·33 knots and 13·4 knots respectively, on their full speed trials.

Torpedo gunboats.

The following torpedo gunboats have been fitted with Thornycroft boilers by the Fairfield Company. As a result, the speed has been increased by over two knots. The result of their trials is taken from the *Engineer* :—

	Coal Consumption Trials.			Full Power.	
	I.H.P.	Speed.	Coal.	I.H.P.	Speed.
Circe	1211	14·3	1·76	5821	21·62
Jason	1203	15	1·74	5863	21·93
Leda	1225	14	1·8	5827	21·84

Destroyers and torpedo boats.

The following results of the trials of destroyers and torpedo boats are taken from the *Engineer* :—

Official Steam Trials of Torpedo Boat Destroyers and Torpedo Boats during 1903.

Name of Vessel.	Makers of Hull and Engines.	Displacement.	Type of Boiler.	Four Hours' Speed Trials.		Four Hours' Coal Consumption.		
				I.H.P.	Speed	I.H.P.	Speed	Coal.
		tons			knots		knots	lb.
Cherwell	Palmer's	540	—	7200	25·6	7100	25·25	2·34
Erne	Ditto	540	Reed	6957	25·606	7108	25·395	2·25
Usk	Yarrow	550	Yarrow	7633	25·873	7739	25·372	1·79
Teviot	Ditto	550	Ditto	7827	25·468	7833	25·405	1·99
Itchen	Laird	549	Laird	6967	25·642	6842	25·25	2·46
Ettrick	Palmer's	540	Reed	7119	25·568	7067	25·313	2·33
Exe	Ditto	540	Ditto	7114	25·64	6856	25·292	2·11
Arun	Laird	549	Laird	7028	25·722	6885	25·39	2·68
Blackwater	Ditto	549	Ditto	6939	25·656	7237	25·414	2·62
Foyle	Ditto	549	Ditto	7126	25·65	6956	25·459	2·79
Velox	Armstrong (hull) Parsons Company (engines)	440	Yarrow	Turbines	27·077	Turbines	27·124	—
Torpedo Boat "No. 109" .	Thornycroft	200	Thornycroft	2871	25·296	2778	25·213	2·809
Ditto "No. 110" . . .	Ditto	200	Ditto	3030	25·333	2885	25·12	2·68
Ditto "No. 111" . . .	Ditto	200	Ditto	2926	25·436	3001	25·321	2·73
Ditto "No. 112 . . .	Ditto	200	Ditto	3030	25·311	2991	25·28	2·49
Ditto "No. 113" . . .	Ditto	200	Ditto	2934	25·122	2830	24·753	2·80

Programme, 1904-5.

The new programme of shipbuilding includes 2 battleships of a new design, to be known as the Lord Nelson class, 4 armoured cruisers, 14 destroyers, and 10 submarines.

France.

The tendency towards economy has been a feature of recent French estimates. The burden of supporting a large Army and at the same time endeavouring to maintain a powerful Navy appears to some French statesmen beyond the capacity of the country. M. Messimy says: "Nous ne sommes pas loin, peut-être, d'avoir dépassé, par l'ensemble de nos dépenses militaires, la limite au delà de laquelle une nation épuise à leurs sources mêmes sa productivité, sa richesse et sa fécondité propres, autant dire sa véritable force et la puissance même qu'elle s'imagine accroitre par des armements nouveaux."

M. Messimy, after pointing out that the efforts of France to increase the battleship strength of her Navy have only resulted in increased efforts on the part of England, comes to the conclusion that French naval policy should be mainly directed to the construction of cruisers and submarines. He writes: "Tandis que fussent-ils trois fois moins nombreux que leurs similaires anglais, nos croiseurs *par le seul fait qu'ils existent*, constituent d'une façon permanente, un avertissement salutaire; la seule existence de dix de ces navires rapides, à grand rayon d'action, que rien ne lie aux rivages de France, et qui peuvent, de l'Europe à l'Amérique, entraver sinon arrêter tout le commerce transocéanique, leur seule existence est de nature à rendre digne d'une sérieuse attention toute perspective d'un conflit avec notre pays."

* * * * *

"Le sous-marin nous permet, en effet, et surtout nous permettrait demain, si besoin était, de tirer le parti le meilleur de notre situation géographique incomparable, en barrant les deux plus grandes routes maritimes du globe qui longent nos rivages, l'Ocean et la Manche, en allant à quelques centaines de milles de nos côtes porter la destruction jusque dans l'intérieur des rades les mieux gardées, jusqu'au fond des ports les plus sûrs. Aucun instrument ne parait mieux adapté au nécessités de l'existence d'une puissance qui, soit en Europe, soit en Asie, soit en Afrique, doit défendre une immense étendue de rivages, et dont les ressources sont limitées par le poids de la charge colossale que lui impose, d'autre part, la nécessité de posséder une puissante armée. . . . . *L'avenir de notre puissance navale est, avant tout, dans le sous-marin.*"

M. Messimy strongly insists upon the advantages of specialising different classes of work at the different ports, and of building ships in groups. Brest and Lorient are the ports at which battleships and cruisers are to be constructed; Rochefort is to be the port for the construction and repair of the torpedo flotilla; Toulon and Cherbourg

are to be mainly repairing ports, but will also undertake the construction of submarines.

A somewhat embittered attack has been made upon M. Pelletan, Minister of Marine, for the delays he is alleged to have caused in the execution of the programme. He contends that progress has been retarded on good grounds of policy and expediency, and reiterates his objections to the programme of 1900, which he is being compelled to carry out. The law promulgated on December 10, in that year, authorised the construction of 6 battleships of 14,865 tons, 5 armoured cruisers of 12,600 tons, 28 destroyers of 305 tons; also torpedo boats, submarines, and submersibles—number not determined—the whole to be completed within six years. Programme of 1900.

The battleships Henri IV and Suffren, and the cruisers Jeanne d'Arc, Amiral Aube, Marseillaise, Sully, Dupleix, Desaix, Kléber, and Jurien de la Gravière are anterior to the present programme.

The Henri IV, which was laid down July 15, 1897, and launched on August 23, 1899, may at last be described as completed. On her full-power trials she attained a speed of 17·2 knots. The Henri IV is of 8807 tons displacement, and has been fully described in previous numbers of the *Naval Annual*. The distribution of the armament has been severely criticised. One of the 5·5-in. guns is mounted above the after 10·8-in. gun turret. It could not be fired over the top of that turret without risk of injury to the gun's crew it contained. Trials were made by placing sheep in the lower turret, and some of them were killed. Battleships completed.

The battleship Suffren of 12,527 tons displacement has also been completed. On her full-power trials, which took place on November 12 at Brest, the engines developed 16,715 I.H.P., against the contract 16,200 I.H.P. In order to test the effect of the shock of a blow from a heavy shell on the mechanism of the turret and on other parts of the ship, a target, composed of a sheet of mild steel 16-in. thick, was erected on the external walls of the fore turret, and was fired at by the heavy guns of the Masséna at short range. Everything inside the turret is said to have been intact at the end of the firing and the mechanism unaffected. The Suffren has joined the Mediterranean Squadron. Suffren.

The Patrie, 14,635 tons displacement, sister ship to the République, launched in 1902, was launched at La Seyne on December 17, 1903. The *Yacht* reported in December that the turrets for the former are to be delivered in June, 1906, while the contract for the delivery of the turrets for the 6·5-in. guns was then still awaiting the signature of the Minister. Orders were received early in March, 1904, to place the ship in a basin of the dockyard at Toulon, where the work République class.

interrupted for some time will go forward. The République class has already been described in the *Naval Annual*. The following additional particulars from the *Yacht* of April 4, 1903, will be of interest:—

The conning tower has 12-in. armour on its forward face; 10-in. armour in rear. The four 12-in. guns are mounted in two turrets on the centre line of the ship forward and aft. Of the eighteen 6·5-in. guns, four are mounted in casemates forward; two in casemates aft. The armour on the face of the casemates is 6·3-in. in thickness. The shields are 5·5-in. thick, and the inner walls 4-in. thick. The forward faces of the bow casemates are joined to the base of the forward turret so as to form a complete athwart-ship bulkhead. The remaining ten 6·5-in. guns are mounted in pairs in turrets on the upper deck, the moving as well as the fixed part of the turret being protected by 6·3-in. armour. This distribution of the armament permits two 12-in. guns, four of the 6·5-in. casemate guns, and eight of the 6·5-in. turret guns to be fired ahead, while two 12-in. guns, two casemate 6·5-in. and eight turret 6·5-in. guns can be fired astern.

Since this description was written there appears to have been further change in the plans. M. Pelletan said in the Chamber, on March 15th, that his competent advisers had decided that in reducing the number of guns in the Patrie their calibre must be increased. They had therefore substituted 7·6-in. guns for those of 6·4-in. calibre. It then became necessary to consider the question of turrets, and it has been decided to suppress the twin mounting in turrets for these guns. Thus the armament of the Patrie will be assimilated to that of the later vessels of the class, the Démocratie and her sisters.

The other four ships of this class—the Démocratie, to be launched at Brest on April 30th; the Liberté, building at Saint Nazaire; the Vérité at Bordeaux, and the Justice at La Seyne—will have slightly more powerful machinery than the République. It is expected that the ships will be retarded, since their turrets and boilers were not ordered at the end of October, 1903. Instead of eighteen 6·5-in. guns these four ships are to carry ten 7·6-in. guns. According to the estimates of 1904 the République should be completed in November, 1905, the Patrie in May, 1906, the Liberté and Justice in November, 1906, the Verité in January, 1907, and the Démocratie at the end of the same year.

The Marceau, after refit, has attained a speed of 16·5 knots. The superstructure has been reduced, but no protection has been given to the secondary armament.

Cruisers.

The Jeanne d'Arc has been commissioned, but is still under trial. Her maximum speed was 21·75 knots, though she developed 1000 I.H.P. more than the contract for her intended speed, 23 knots. The bilge keels are to be reduced in size.

Condé class.

The Marseillaise, displacement 9856 tons, was commissioned in November, to form part of the Northern Squadron, but is to proceed

FRENCH ARMOURED CRUISER "SULLY."

to the Mediterranean, being replaced by the Amiral Aube, which made her preliminary trials on September 29. With natural draught her engines developed 14,729 I.H.P., with a coal consumption of 1·477 lb. per H.P. per hour. The speed was 19·7 knots. The full-power trials took place on December 17, when she attained a speed of 21·9 knots, against 21 knots contracted for, with 22,155 H.P., and a coal consumption of 1·83 lb. per I.H.P. per hour. The Gloire, on her full-power trials at Lorient, attained a speed of 21·2 knots with 20,800 I.H.P. On the trials under natural draught she steamed 19·3 knots with 14,400 I.H.P. She is fitted with Niclausse boilers, and adapted for mixed fuel, coal, and petroleum. The trials of the Condé and Sully are in progress. The Condé class have been much criticised in the *Yacht*, mainly on account of weakness in their construction. Their armament is poor considering their size, and comprises only two 7·6-in. and eight 6·4-in. guns. The Léon Gambetta class, though displacing only 2500 tons more, carries double the number of guns.

Dupleix class.

The Desaix, displacement 7578 tons, on her coal consumption trials maintained a speed of 18·6 knots for twenty-four hours, the engines developing 10,500 H.P., with a coal consumption of 1·47 lb. per I.H.P. per hour, instead of 1·76 lb. as estimated. On the full-power trials, which took place at Cherbourg, on November 17, the engines developed 17,715 H.P., with a coal consumption of 1·847 lb. per H.P. per hour. The speed attained was 20·7 knots. The Dupleix has been commissioned. On the natural draught trials she steamed 18·5 knots with 10,000 I.H.P.; on the full-power trials her engines developed 17,980 I.H.P., instead of the 17,100 estimated. The Kléber, while on her trials at Cherbourg, struck the submarine Algérien, which was attacking her.

Leon Gambetta class.

The Léon Gambetta, of 12,351 tons displacement, and 22 knots speed, which was laid down on January 15, 1901, and launched on October 26th of the same year, commenced her trials in December. Owing to a faulty adjustment of her compasses she ran in a fog upon the Black Rocks off the Goulet of Brest, broke two of her propellers, and was otherwise badly damaged. She will not again be ready for her trials till July. The Jules Ferry, sister ship to the Léon Gambetta, was launched at Cherbourg on August 23. The third ship of the class, the Victor Hugo, was launched at Lorient, on March 30. The Jules-Michelet is to be laid down on the slip from which the Victor Hugo is to be launched. Her dimensions are the same as those of the Victor Hugo class, but she is to have a knot more speed, and to carry four fewer 6·4-in. guns. The plans of the Ernest Renan have been considerably

modified in accordance with the views of the Minister of Marine. The displacement had been increased to 13,347 tons, and the maximum coal supply from 2100 to 2250 tons. The armament and speed will be the same as those of the Jules Michelet. A sister ship, C 16, is to be laid down at Brest. According to the present programme the dates of completion of the above cruisers is as follows:—Victor Hugo, July, 1905; Jules Ferry, August, 1906; Jules Michelet, July, 1907; C 16, July, 1908; and Ernest Renan, August, 1908. The Léon Gambetta will be much delayed.

Jurien de la Gravière. The Jurien de la Gravière, which was commissioned for service on the North Atlantic Station, has been recalled on account of defects in her engines. The cruiser is fitted with small-tube water-tube boilers, of the Du Temple-Guyot type, which, according to her captain, from the very first gave an infinity of trouble, and it was only with great difficulty that she at last attained her designed speed of 23 knots during a two hours' run. She left Lorient for the West Indies on July 24, with orders to cross the Atlantic at a speed of 15 knots, but before she had run twenty-four hours she had expended over a hundred tons of coal. It became necessary to ease down, first to 12 knots and then to 10. In his report, her captain says: "With ten boilers in use it was impossible to keep the engines working at 120 revolutions. The leakage of water from the tubes was continual, and they became so foul that it became necessary to reduce the revolutions first to 110, and then to 90, giving the ship a speed of only 10 knots. The engineers complain that it is impossible to stoke properly, because the coal is distributed in 70 bunkers, of which 50 are for the reserve stock. The temperature of the engine-room and stokeholds ranged from 100° to 150° Fahr., and the engineers and stokers had to be continually relieved, as they were unable to stand the heat. Although she is supposed to steam at 23 knots, it is doubtful if she could maintain a speed of 20 knots, even for three hours; she is supposed to have a range of action of 9300 miles at 10 knots, when her full supply of coal, 900 tons, is on board, but as things are at present, her range of action is but little over 4000 miles."

Dupuy de Lôme. The Dupuy de Lôme is to be refitted at Brest, and to receive Normand-Sigaudy water-tube boilers in place of her old locomotive boilers. It is expected that the reduced weight will enable her coal capacity to be increased by at least 250 tons, and her range of action to be proportionately extended.

Destroyers. The following destroyers were launched in 1903:—Dard, Mousqueton, Pistolet, Bélier, Catapulte, Bombarde, Arbalète, Sarbacane,

Epieu, Harpon and Fronde. Of the destroyers in hand, the Carabine, Francisque, Sabre, Stylet, Tromblon, Pierrier, Obusier, and Mortier are under construction in the dockyards, while "M 38" and "M 39" are to be laid down in 1904. The remaining 17 have been ordered at private yards. The majority of these boats will be completed in 1905, and the remainder will be completed, with the Stylet, Tromblon, Pierrier, Obusier, Mortier, M 38 and 39, and Claymor in 1906. They have mostly the same characteristics—305 tons, 6300 h.p., and 28 knots speed—but the two to be laid down this year will have a displacement of 335 tons, 7200 I.H.P., and a speed of 30 knots. As a result of accidents to the Pique and Yatagan, M. Normand suggested alterations, and the examination of his plans caused delay.

The destroyers recently completed have attained a speed much in advance of the 27·4 knots of the Durandal. For example, the Arquebuse, built by M. Normand at Havre, steamed at 30·75 knots; the Arbalète, 31·58 knots; the Bombarde, 30·5 knots; the Mousqueton, 29·8 knots: the Javeline, 29·32 knots, the Mousquet, 30·2 knots, and the Dard and Balliste 29·4 knots.

The Espignole, which was sunk near Cape Lardier, has been struck off the list of the fleet.

Torpedo boats.

Of torpedo boats belonging to the programme of 1900, though not specifically indicated in it, four are slowly progressing at Saigon. All the others as yet completed or in hand are in private yards, and number 38 (Nos. 256–276 and 278–294); 23 others have been ordered. Boats Nos. 278–294 (90 tons, 26 knots) are to be completed in 1904. Torpedo boat No. 293, completing at the Normand yard, Havre, has turbine motors supplied by the Parsons Company. She is intended as an experimental boat to test the system. Boat No. 294, now building at the Chantiers et Ateliers de la Gironde, Bordeaux, will be fitted with Bréguet turbine motors (6 screws), and is intended for 24 knots, but a speed of 26 knots is anticipated. The boat will have Du Temple boilers. Nos. 297, 298, and 299 are in hand at the same yard.

Submarines

The progress which was expected has not been made with the submarine boats. Twenty-eight are completed, or in hand. Thirteen were to have been laid down in 1902, but two only, the Aigrette and Cigogne, were begun. The Omega of the 1903 programme was put in hand, but of 18 others belonging to the same year, M. Messimy reports that only six have been begun, these being larger (approaching 400 tons), as the result of trials made with the boats already completed. Several boats were launched in 1903:—Alose, Anguille, Bonite, Dorade, Grondin, Méduse, Otarie, Oursin, Phoque, Souffleur,

Thon and Truite. Sixteen additional are in the list for 1904, being Nos. Q 59 to Q 74.

Submersibles. Particulars have been published of the special submersible boats "X," "Y," and "Z" laid down in 1892 and 1893 and designed by MM. Romazotti, Bertin and Maugas. "Y" is nearly completed, and "X" and "Z" should be delivered this year. "X" displaces 168 tons, and is 121 feet 6 inches long, with 10 feet 6 inches beam, and a draught of 7 feet 6 inches when navigating on the surface. She is provided with two screws, and is propelled by electricity. The intended speed is given as 10½ knots. "Y" is larger, displacing 213 tons, and is 142 feet 8 inches long, with 9 feet 9 inches beam. She has but one screw, and the speed is to be 11 knots. "Z" has a displacement of 202 tons, with 135 feet 8 inches length and 9 feet 8 inches beam, and a speed also of 11 knots. The two large submersibles Aigrette and Cigogne have been laid down at Toulon. They will have a displacement of 172 tons, and will be 117 feet 6 inches long, with a beam of 12 feet 6 inches, and 8 feet 6 inches draught.

Manœuvres omitted. Owing to financial considerations and the views of the Minister of Marine, there were no naval manœuvres in 1903.

Personnel. The *personnel* of the French Navy, according to the Preliminary Budget, is to comprise 1850 executive officers, 327 engineers, 32,051 petty officers and seamen, and 13,955 engine-room artificers and stokers, besides armourers, bandsmen, etc.

GERMANY.

Estimates. The estimates for the year 1904 amount to £11,059,908, as compared with £10,257,028 in 1903. The vote for new construction included under the special ordinary estimates amounts to £3,477,972, or about £70,000 less than last year.

Battleships. Modern German battleships are of successive homogeneous classes; four of the Brandenburg class (now undergoing construction), five of the Kaiser Friedrich III class (all in commission), five of the Wittelsbach class (including the Wittelsbach and Wettin), and eight of the Braunschweig class (now in hand).

Wittelsbach class. The three remaining ships of the Wittelsbach class—Zähringen, Mecklenburg, and Schwaben, displacement 11,611 tons—have been completed. The Mecklenburg, built at the Vulkan Yard, Stettin, passed through her trials in October, and has been commissioned. The following particulars were given in the *Marine Rundschau*:—

In a six hours' run under forced draught with 109 revolutions per minute, her engines developed 14,355 I.H.P., the contract being for 110 revolutions and 13,600 H.P. Her actual speed for this run is not given, but her contract speed is 18 knots. The coal consumption was 1·7 lb. per H.P. per hour. In an endurance run of 94½

hours, the engines developed 9659 I.H.P., against an expected 9500 I.H.P., the average number of revolutions being 96 per minute, and the speed 16·42 knots. The coal consumption measured during 28 of the 94½ hours was at the rate of 1·64 lb. per H.P. per hour. The trial was interrupted after the 94½ hours, in order to take advantage of the deep water in which the ship found herself, and to make a trial run with forced draught, when the speed attained was 18·1 knots.

The trials of the Schwaben are in progress.

Braunschweig class.

Of the Braunschweig class, of 12,997 tons displacement, the Elsass (ex J) was launched at Danzig on May 16, 1903, ready autumn, 1904; the Hessen (ex L) at the Germania Yard at Kiel, on September 18, ready summer, 1905; and the Preussen (ex K) at the Vulkan Yard, Stettin, October 31, ready spring, 1905. The Lothringen (ex M) was laid down at the Schichau Yard, Danzig, on March 31, 1903. "N" has been begun at the Germania Yard, Kiel. Two other battleships of the class, "O" and "P," are to be begun in 1904.

Armoured cruisers.

The armoured cruiser Prinz Friedrich Karl, which was launched from the yard of Messrs. Blohm & Voss at Hamburg, in June, 1902, has made her trials. She is sister ship to the Prinz Adalbert, of 8903 tons displacement, and has an estimated speed of 21 knots, with 17,000 I.H.P.

The Roon (ex Ersatz Kaiser) was launched at Kiel on June 27, and the last charge for her construction is included in the estimates of 1904. Displacement 9348 tons; speed 21 knots, with 17,000 I.H.P. Her dimensions are as follows: length, 413 ft. 3 in.; beam, 65 ft. 7 in.; mean draught, 24 ft. 3 in. The protection consists in a complete armoured belt 7 ft. 6 in. in depth, 4 in. thick amidships, and 3 in. thick at the ends. Above the belt, to the battery deck and over a length of 147 ft. 7 in., the armour is 6 in. thick; and above this, for a length of 82 ft., 4 in. thick to the upper deck. The armament comprises four 8·2-in. and ten 5·9-in. guns. The Roon is to be ready in the autumn of 1905.

A sister vessel, the Ersatz Deutschland, is well advanced at Hamburg. In the votes of 1904 provision is made for laying down an armoured cruiser, C.

Third-class cruisers.

The third-class cruisers Arcona, Frauenlob and Undine, of 2672 tons displacement, have completed their trials. The Arcona attained a speed of 21 knots with 8587 I.H.P., the Frauenlob 21·1 knots with 8594 I.H.P.

The newer type of third-class cruisers are somewhat larger than the Arcona. They are of 2952 tons displacement; length, 341 ft.; beam, 43 ft. 3 in.; mean draught, 16½ ft.; speed, 22 knots; bunker capacity, 800 tons; armament, ten 4·1-in., and twelve 1·45-in. guns, and two torpedo-tubes. The conning tower is protected by 4-in.

armour, and the armoured deck is 2 in. thick. Of these the Bremen was launched at the Weser Yard, at Bremen, on July 9. The Hamburg was launched from the Vulkan Yard, Stettin, on July 25. On the voyage to Kiel she is said to have attained a speed of 23·3 knots with 11,000 I.H.P. The Berlin was launched at Danzig on September 22, and the Lübeck, built as Ersatz Merkur, fitted with turbine engines, at the Vulkan Yard, Stettin, on March 26. Another cruiser of this class is under construction, namely "M," at the Weser Yard, Bremen. Three other cruisers of the class, "N," Ersatz Alexandrine, and Meteor, are to be begun in 1904.

The gunboat Eber, of 980 tons displacement, 1300 I.H.P., and 13½ knots speed, has been launched at Stettin.

Destroyers. Three destroyers, built by Schichau, at Elbing, were launched in 1903:—Nos. 117, 118 and 119, of 350 tons, 6000 I.H.P., and 29 knots speed. Another division of destroyers is to be begun in 1904.

Submarines. It is stated that Germany has five submarines completed (three Nordenfelts, a Holland, and an experimental boat, built at the Howaldt Yard, Kiel), and a modified Holland building, while two large submersibles are proposed.

Two river gunboats, the Tsingtau and Vaterland, have been completed for service in the Chinese rivers.

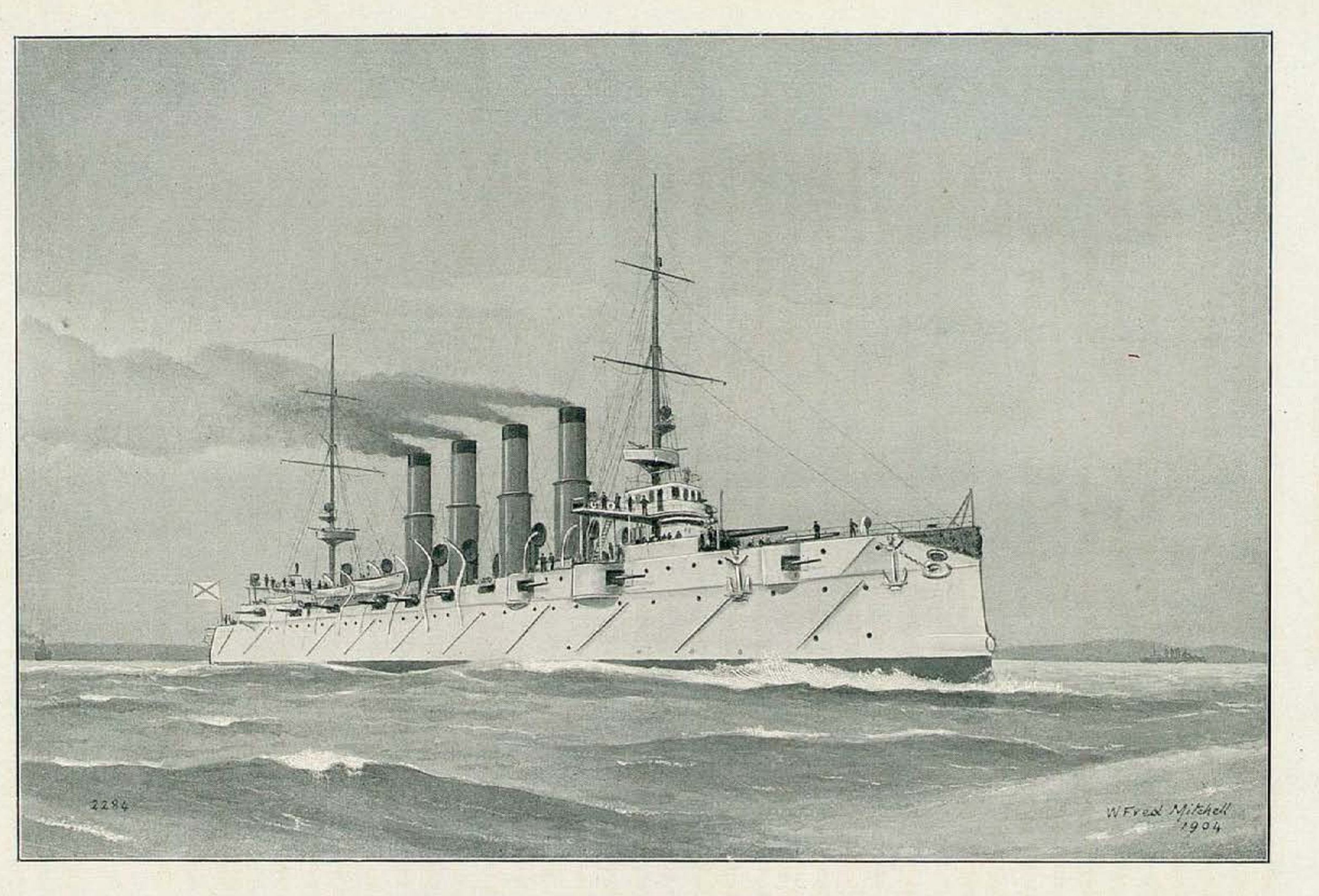
Reconstruction. The refit of the Wörth has been completed. The refit of the three other battleships of the Brandenburg class will be finished in 1904.

The cruiser Kaiserin Augusta is being fitted with new boilers and all woodwork removed, and the Irene is also being reconstructed. Both should be out of hand this year.

Personnel. The effective *personnel* of the Navy in 1904, including 1309 officers, 518 cadets, 223 engineers (as compared with 75 in 1893), 15,576 seamen and boys, 1279 marines, etc., will amount to a total of 38,025 officers and men.

Russia.

The War. The Russian Navy has been put to the test of war in the hostilities with Japan, and in many ways has been found wanting. For some time past the new ships, as they were completed, were despatched to the Far East, for which they had been built, but war overtook the Russians before they were fully prepared. The battleships Cesarevitch and Retvizan, the armoured cruiser Bayan, some new protected cruisers, and a number of destroyers had reached Port Arthur, but the battleship Oslabya, flying the flag of Rear-Admiral Wirenius, after being delayed in the Mediterranean by machinery defects which



RUSSIAN CRUISER "VARYAG."

(Sunk at Chemulpo.)

involved the docking of the ship at Spezia, was in the Red Sea when hostilities broke out, having in company the old armoured cruiser Dmitri Donskoi, the protected cruiser Aurora, and some destroyers, as well as certain cruisers of the Volunteer Fleet in charge. All these have since passed through to the Mediterranean, on their return to the Baltic. Hostilities opened with an attack by Japanese torpedo-boats on the Russian Fleet off Port Arthur. At midnight on February 8, the new battleships Cesarevitch and Retvizan, and the protected cruiser Pallada, were torpedoed, receiving serious damage, as to the gravity of which we have as yet no authentic information. The Retvizan was beached near the harbour mouth, which she partially blocked, but she has since been floated and taken into the harbour. The Cesarevitch and Pallada got into the harbour and sank in the mud. It is worthy of note that the Retvizan had been built specially with a view to resist torpedo attack. Her armoured deck, instead of curving to meet the lower edge of the armour belt, was continued downward to the double bottom, thus constituting a protective wall inside the armour, which might be called a longitudinal armoured bulkhead. It is believed this arrangement stopped short of the stern of the ship, where the damage was inflicted by the torpedo. On February 9, in action outside Port Arthur, the battleship Poltava and the protected cruisers Diana, Askold, and Novik were injured by gunfire, but appear to have been since repaired. In the action off Chemulpo on February 9, the new protected cruiser Varyag was so damaged that she took refuge in the harbour, where she sank, and the old gunboat Korietz was destroyed. The Japanese hope to float and repair the Varyag. The third-class cruiser Boyarin was reported to have been torpedoed on February 14. The mining ship Yenesei was destroyed accidentally, with much loss of life, by fouling a mine in a mine-field which she was engaged in repairing at Dalny on February 11. Some of the destroyers have also suffered. The Vnushitelni, built at Havre, was driven ashore in Pigeon Bay by the Japanese and destroyed, on February 25. The Steregustchi was sunk in action outside the harbour at Port Arthur on March 11. The Skory was sunk by fouling a mine on entering the harbour, on March 16. Both were built at Port Arthur. The Volunteer cruiser Ekaterinoslav was captured by the Japanese.

The Navy Estimates for 1904 amount to £11,835,669, as compared with £12,107,420 actually spent last year, the original estimates being largely exceeded. The votes for naval armaments and new construction amount to £5,289,138, as compared with £5,455,727. Navy Estimates

Battleships.

The battleship Cesarevitch, built at La Seyne, on her final trials on July 23, which lasted for 12 hours, made at first 18·78 knots, and later over 19 knots. On a previous trial she maintained the speed of 18·47 knots for 12 hours. She is fitted with Belleville boilers.

Borodino class.

The Imperator Alexander III (displacement, 13,516 tons), on her official trials, which took place at Kronstadt on October 24, averaged 17·36 knots in four runs over the measured mile, with 16,265 I.H.P., and a coal consumption of 2 lb. per H.P. per hour. The Alexander III is also fitted with Belleville boilers. She was intended to proceed to the Far East in the spring, but her trials appear to have taken place before she was fully completed, and she was unable to join the Oslabya in the Mediterranean. The Borodino, Orel, and Kniaz Souvaroff are reported to be about to begin their trials. The Slava, laid down October 4, 1902, was launched on August 29, 1903, at the Baltic Yard, St. Petersburg, finished to the extent of 67 per cent. The rate of construction in Russian shipbuilding yards appears to be improving.

The battleship Kniaz Potemkin Tavritchesky (12,480 tons) has made her trials in the Black Sea.

New programme.

Two battleships of 16,630 tons displacement have been laid down, the Imperator Pavel I, at the Baltic Yard, and the Andrei Pervozvannui, at Galerny Island, St. Petersburg. They are to be fitted with Belleville boilers. Two battleships of 12,500 tons displacement, 10,600 I.H.P., and 17 knots speed, the Ioann Zlatoust and Evstafi, are to be built in the Black Sea.

Cruisers.

The cruiser Oleg, of 6675 tons displacement, was launched at St. Petersburg on August 27. The estimated speed is 23 knots with 19,500 I.H.P. The armament comprises twelve 6-in. guns, four mounted in pairs in turrets, four in casemates, and four on deck. The two torpedo-tubes will be both submerged. At the time of the launch 63·6 per cent. of the cruiser was completed. The Kagul, sister ship to the Oleg, was launched at Nikolaieff on June 2, and, according to the *Kronstadtski Viestnik*, two other cruisers of the class are to be built in the Black Sea.

The Almaz was laid down on September 25, 1902, and was launched at the Baltic Yard, St. Petersburg, on June 2, 1903. Displacement, 3285 tons; speed, 19 knots, with 7500 I.H.P. She is somewhat luxuriously fitted, and was intended to serve as a yacht for the Viceroy in the Far East.

The third-class cruiser Jemtchug was launched on August 27; the Izumrud on October 24. Displacement, 3080 tons; speed, 24 knots. At the time of launching they were finished to the extent of 77·28 per

cent. They will carry six 4·7-in., six 1·85-in., two 1·45-in. guns, and one 2·5-in. landing gun.

The gunboat Khivinets, of 1316 tons displacement, and the torpedo depôt vessel Volga are in hand at the New Admiralty Yard, St. Petersburg.

The Volunteer cruisers Moskva and Kherson, of 19 knots speed, have been bought by the Government, and re-named Angara and Lena.

Destroyers. Messrs. Creighton are to build three improved boats of the Prytki (Sokol) class. The Zadorni, Zorki and Zvonki are completing at Nikolaieff, and the Gromki, Gromiastchy, and Grozni, on the Neva. Four boats built by Messrs. Creighton, were allowed to enter the Black Sea, where the flotilla of destroyers built and building now numbers thirteen. Twelve destroyers have been built or put together at Port Arthur, of which the last, the Stratni, was launched on November 25, 1903.

Torpedo-boats. Tenders have been invited from German yards for the construction of twelve large sea-going torpedo-boats, to be completed within a year. Torpedo-boat No. 221 foundered between Port Said and Suda Bay.

Submarines. The *Novoe Vremya* recently stated that a new Russian submarine boat, built at the Baltic works, had arrived at Kronstadt for her trials. She is cigar-shaped and has a length of 77 ft. and a beam of 14 ft. Her complement is 12 men. Her torpedo tubes are fitted with the apparatus of the Russian engineer, Djevetski, which permits the torpedo to be aimed and directed immediately after it has issued from the tube. When the boat is on the surface gasoline is used as fuel; when submerged the motive power is electricity supplied from accumulators. The *Moniteur de la Flotte* has reported that the submarine of M. Rubinoff made a successful run of 36 hours from Kronstadt to Bjoerko, of which 26 were submerged, while a storm was raging; also that six of the same type were intended to be built at the Baltic Yard. The following are the particulars:—Surface displacement, 175 tons; length, 77 ft.; diameter, 14 ft.; 200 I.H.P. (petroleum engine); speed, 10 knots; submerged, 8 knots (with electric motor). Two other submarines (one completing in the Black Sea) are from the plans of M. Drzewiecki. Length, 80 ft.; diameter, 14 ft.; surface speed, 12 knots. The Matros Peter Koshka displaces 20 tons, and is 50 ft. long and 14 ft. diameter, with a surface speed of 8 knots, and submerged speed of 6 knots. Another submarine boat has been designed by Engineer Pukaloff, and is said to have surface and submerged speeds of 10 and 7 knots.

United States.

The United States will shortly become the second naval power of the world. There are at the present time no less than 24 first-class

battleships completed, completing, and under construction, thirteen being in the two latter categories.

Battleships. The Missouri of the Maine class has been commissioned in the North Atlantic Squadron. On the Cape Ann course of 33 miles and return she averaged 18·22 knots, the maximum speed reached during the trial being 18·75 knots. The Ohio, building at the Union Iron works, was advanced 83 per cent. towards completion on December 1, 1903.

Virginia class. There are five battleships of the Virginia class, 14,948 tons displacement, on the stocks. In July 1902 they were a year behind their contract date. Admiral Bowles, Chief of the Bureau of Construction and Repair, says in his latest report, that they have fallen still further behind. The delay he attributes to the following causes: "Inadequate plans; changes in the disposition of armour or armament, or in details of the designs; delays in the delivery of armour and ordnance; delays in the delivery of structural materials; details due to an inadequate supply of skilled workmen, or to Government inspection." He believes these causes are in process of removal, and, "notwithstanding the difficulties encountered, that the period actually occupied from the time orders are given to build a vessel until the time that ship is ready for commission compares not unfavourably with the best results obtained in England and Germany."

Louisiana. The Louisiana and Connecticut, building at Newport News and the New York Naval Yards respectively, were described in the *Naval Annual* of last year. They are of 16,000 tons displacement. Three other battleships of this class have been laid down, the Kansas, Minnesota, and Vermont. There are some modifications, and the following are particulars of distribution of armament and protection from the *Army and Navy Journal* of New York:—

The main batteries of the ships will consist of four 12-in. breech-loading rifles, eight 8-in. breech-loading rifles, and twelve 7-in. breech-loading rifles. Their secondary batteries will have twenty 3-in. 14-pounder rapid-fire guns, twelve 3-pdr. semi-automatic guns, six 1-pdr. automatic guns, two 1-pdr. semi-automatic guns, two 3-in. field guns, two machine guns, cal. ·30, and six automatic guns, cal. 30. The 12-in. guns will be mounted in pairs, in two electrically controlled, balanced, elliptical turrets, on the centre line, one forward and one aft, each with an arc of fire of about 270 degrees. The 8-in. guns will be mounted in pairs, in four electrically controlled, balanced, elliptical turrets, two on each beam, at each end of the superstructure. The 7-in. guns will be mounted in broadside, on pedestal mounts on the gun deck behind 7-in. armour, each gun being isolated by splinter bulkheads of nickel steel of from 1½ to 3 in. thick; forward and aft guns arranged to fire right ahead and right astern, respectively; other 7-in. guns to have the usual broadside train. The guns of the secondary battery will be arranged in commanding positions. The hull of each of the vessels will be protected at the water line by a complete belt of armour, 9 ft. 3 in. wide, having a uniform thickness of 9 inches for about 285 feet amidships, forward and aft of which points the thickness is gradually decreased to 4 in. at the stem and stern. The lower casemate armour extends to the limits of the magazine spaces and reaches from the top of the water line belt to the lower edge of the 7-in. gun ports on the

main deck, and is 7 in. in thickness, the athwartship bulkheads at the ends of the casemate being 6 in. thick. The casemate armour around the 7 in. guns on the gun deck is 7 in. thick and the splinter bulkheads are from 1½ to 2 in. thick. The 12-in. barbettes will have 10 in. of armour in front and 7½ in. in the rear above the gun deck. There will be a complete protective deck extending from stem to stern, the deck being flat amidship, but sloped at the sides throughout and sloped at each end. It will be built up of 20-pd. plating throughout, with nickel steel of 40 pds. on the flat and 100 pds. on the slopes. The engines will be of the vertical, twin-screw, four-cylinder, triple-expansion type, of a combined I.H.P. of 16,500. The screws will *turn outboard from the top*. Each vessel will be lighted throughout with electricity, and each vessel will be built for use as a flagship.

Two smaller battleships, the Idaho and Mississippi, of 13,000 tons were proposed. The Board of Construction agreed upon sketch plans with the following characteristics :— Idaho.

Length, 375 ft.; breadth, 77 ft.; mean draft, 24 ft. 6 in.; trial displacement, 13,000 tons; horse-power, 10,000; trial speed, 16½ to 17 knots. Battery: Four 12-in., B.L.R.; eight 8-in., B.L.R.; ten 7-in., B.L.R.F.; twelve 3-in., B.L.R.F., six 3-pdr.: four 1-pdr.; two 3-in. field; two machine; six automatic. Armour protection; Water-line belt, 9 in., tapered to 7 in. at bottom in way of machinery space, reduced at ends to 7 in., 5 in., and 4 in.; casemate and athwartship, 7 in.; main turrets, 12 in. and 8 in.; main barbette, 10 in., 7½ in., and 6 in.; lesser turrets, 6½ in. and 6 in.; lesser barbettes, 6 in. and 4 in.; sub-barbette, 3 3-4 in.; ammunition tubes, 3 in.; conning tower, 9 in.; conning-tower cube, 6 in. Full coal capacity, 1,750 tons.

It is seen that the vessel which the Board has agreed upon, as compared with the Connecticut, will have, as regards armament, the same main battery, excepting only a reduction of the number of 7-in. guns from 12 to 10. Owing to the reduction in length from 450 ft. to 375 ft., the secondary battery is somewhat less than the Connecticut's, the principal difference being in the reduction from 20 to 12 3-in. and 12 to 6 3-pdr. guns. Part of the reduction in secondary battery is due to the fact that in order to secure the heavy main battery and corresponding protection of a first-class battleship it is necessary to omit the after military mast, and to reduce the freeboard aft as on the Maine class. It is accordingly not intended to fit these vessels as flagships. The weight given to armour protection will be 3,377 tons, or 25 per cent. of the displacement, as against 3,992 tons and 24 per cent. for the Connecticut. The horse-power of the main engines will be 10,000 against 16,500. The Board is of the opinion that in working out the final designs this power will provide a maximum trial speed of 17 knots.

Although the full coal capacity will be about 1,750 tons, as against 2,200 in the case of the Connecticut, its endurance at 10 knots is estimated at about 5,750 knots, against about 5,300 for the Connecticut at 10 knots under ordinary conditions.

The contract for the hulls of these two vessels has been awarded to Messrs. Cramp for £600,000.

Admiral Bradford and Admiral Melville objected to the sacrifice of speed as well as to decreasing the range of action. Admiral O'Neil, the President of the Board, as well as Admiral Bowles, the chief constructor, preferred to secure good protection and heavy armament, though in a letter to the Secretary of the Navy, dated August 1, Admiral Bowles asserts that the Idaho will have greater coal endurance at all cruising speeds than any vessel yet designed.

The Kearsarge made the passage across the Atlantic from the Needles to Bar Harbour at an average speed of 13·1 knots, encountering a good deal of bad weather. This voyage is the most remarkable that has ever been made by a battleship.

Of the armoured cruisers of 13,680 tons displacement and 22

Armoured cruisers. knots speed, the West Virginia was launched at Newport News on April 22, the Colorado and Pennsylvania from Cramp's Yard on April 25 and August 22 respectively, and the Maryland at Newport News on September 12.

The South Dakota still remains to be launched.

Charleston. The Charleston, of the smaller, lighter armoured cruiser class which includes also the St. Louis and Milwaukee, was launched at Newport News on January 23. She is an improvement on the Olympia class, displacing 9700 tons, 424 ft. long on the water-line, with 66 ft. beam, an extreme draught of 25 ft. 6 in. Protection is given amidships by 4-in. steel, extending at the waterline about half the length of the cruiser. There is also a 3-in. deck. The armament comprises 14 6-in., 18 14-pdrs., 12 3-pdrs., eight 1-pdrs., and four machine guns. The cruiser is supplied with Babcock and Wilcox boilers and engines of 21,000 I.H.P., and her speed is to be 22 knots. The maximum coal capacity is 1500 tons, and the complement 664.

Denver Class. Of the smaller cruisers of the Denver type, the Des Moines, which was built at Fore River, attained a speed of 16·63 knots on her trials on December 5, the contract speed being 16·5 knots. The Chattanooga has been launched at Elizabeth Port, from the yard of Messrs. Lewis Nixon; the Tacoma at the Union Iron works, San Francisco; and the Galveston from Messrs. Trigg's Yard, Richmond.

.boats. Two gunboats, the Dubuque and Paducah, of 1000 tons displacement are under construction. Length, 174 ft., beam 35 ft.

Five destroyers, the Decatur, Bainbridge, Barry, Chauncey, and Dale, sailed in December from Fort Monroe on an 18,000 mile voyage to the Philippines by Gibraltar and the Suez Canal.

The Macdonough and Lawrence, built by the Fore River Company, have been delivered, speed 30 knots; displacement about 400 tons. The Stringham and Goldsborough, 30 knots, and the Blakely, Nicholson, O'Brien and Tingey, 26 knots, are also on the point of completion, or have been delivered. No others are in hand.

New Programme. When the Secretary of the Navy appeared before the House naval committee, he submitted two propositions based upon a report submitted by the general board. The first is on the lines of the last programme, and calls for the expenditure of $34,500,000, the amount appropriated last year for naval increase, which will include not only the cost of building the vessels, but the cost of armour, armament and equipment. This expenditure is for one battleship of about 16,000 tons displacement, practically similar to the Vermont, Kansas, and Minnesota, which are an improved type of the Connecticut and the Louisiana; one armoured cruiser of about 14,500 tons, similar in

most respects to the Tennessee and the Washington; four very fast scout cruisers not exceeding 4000 tons each; three protected cruisers not exceeding 8000 tons each, and two colliers. Two submarine torpedo boats also are included in the programme, but these are to be paid for out of the appropriation of $500,000 now available. The second proposition provides for the expenditure of $30,000,000, and is similar to the first, with the exception that only two scout cruisers are included.

The Board of Construction of the Navy Department has prepared a report setting forth the tactical value of torpedo tubes, in which it recommends that they be fitted in all the new ships, even those of small tonnage. This is a complete reversal of the original decision of the Board, which ruled against the submerged torpedo, and as a result all of the battleships and cruisers beginning with the Pennsylvania class are without submerged torpedoes. So strong was the protest from all sides against the decision that the campaign in favour of the torpedo tube has been successful. It is the contention of the constructors of the Navy that the torpedo tube is not practicable for use in the smaller vessels. But on vessels of thirty-five feet beam and upwards it is believed the torpedo tube furnishes a very effective weapon of warfare.

ITALY.

Battle-ships.

The Navy Estimates amount to £5,087,642, or almost exactly the same as last year. On new construction there is to be spent £848,000 under the ordinary, and £185,512 under the extraordinary estimates, or a total of £1,033,512 as compared with £1,095,337 in 1903–4.

Of the two new battleships of the Vittorio Emanuele Class alluded to in the *Naval Annual* of last year, the Regina Elena was launched at Spezia on September 20, and the Vittorio Emanuele at Castellamare on October 21. The launch of the Roma is fixed for April 28 at Spezia. The Napoli will probably be launched in October of this year. The displacement is 12,425 tons, and the estimated speed 22 knots. Protection is afforded by a complete water-line belt of Terni steel 9 ft. 2 in. in depth, having a thickness of 9¾ in. amidships, diminishing to 4 in. at the ends. Above the water-line belt, for a depth of 7 ft. 10 in and for half the length, the side is protected by 8-in. armour. The transverse bulkheads and the conning-tower are also protected by 8-in. armour. The armour deck is 2 in. in thickness. The Roma is to be fitted with Belleville, and the Napoli with Niclausse boilers. Another battleship of the

Vittorio Emanuele type is to be laid down at Castellamare during the current year.

Italia. The old battleship or armoured cruiser Italia is to be re-fitted. Outside her hull armour is to be fixed for 279 ft. of her length, greatly increasing the beam. She is to receive new boilers, and wood fittings are to be removed as far as possible.

The gunboat Cyclope, built at Naples, of 844 tons displacement, attained a speed of 15 knots on her trials, with 2298 I.H.P.

The destroyer Lampo, of 320 tons, has passed through her trials.

The programme of new construction includes sixteen first-class torpedo boats and five submarines, one of which, the Glauco, is to be built at Venice.

JAPAN.

Battle-ships. Two battleships have been ordered from Messrs. Vickers, Sons & Maxim and Sir W. G. Armstrong, Whitworth & Co. respectively. Each vessel will be of 16,400 tons displacement, and will be fitted with machinery to enable a speed of between 18½ and 19 knots to be attained. The armour protection will be arranged on the concentrated casemate system first introduced in the Japanese battleship Mikasa, completed in 1902 by the Vickers Company.

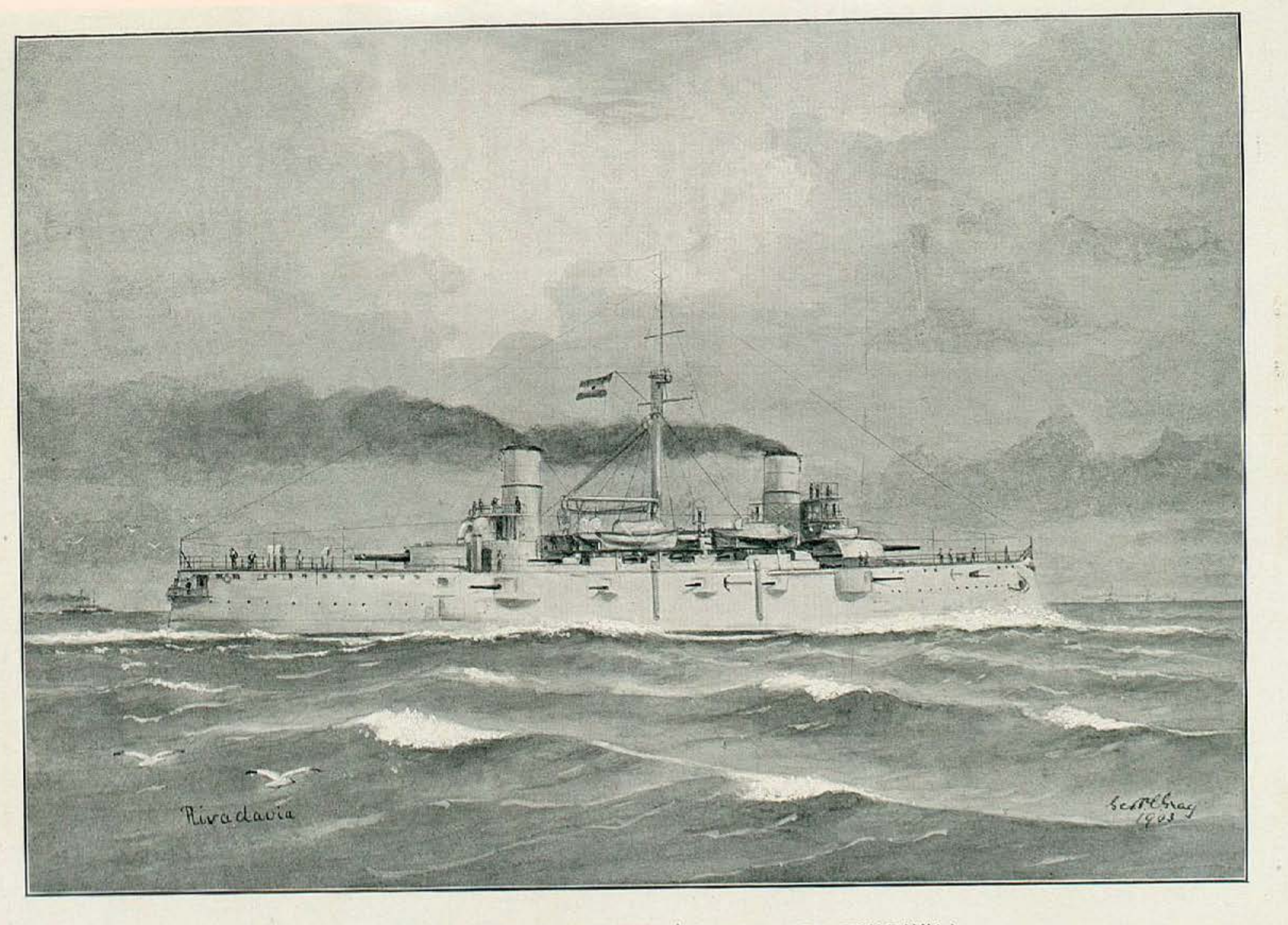
Ships purchased. The Japanese have purchased the armoured cruisers Rivadavia and Moreno of 7700 tons displacement, which were built by Messrs. Ansaldo for the Argentine Government, and have re-named them Kasuga and Nisshin respectively. They are well protected, and carry a powerful armament for cruisers. Their speed is, however, only 20 knots. These ships reached Japan shortly after the commencement of hostilities. Their armament is not the same, the Kasuga having one 10-in., two 8-in., and fourteen 6-in. guns, and the Nisshin four 8-in. and fourteen 6-in. guns.

A small cruiser, the Tsushima (3420 tons), is under construction at Kure; another of the same class, the Otowa, at Yokosuka; and the Uji, a gunboat of 620 tons, is being completed at Kure.

A river gunboat, with a speed of 13·27 knots, has been built by Messrs. Thornycroft.

ARGENTINA.

Under the terms of the Convention with Chile, the armoured cruisers Moreno and Rivadavia have been sold to Japan, as mentioned above.



JAPANESE ARMOURED CRUISER "KASUGA" (EX RIVADAVIA.)

Austria.

Of the battleships of the Habsburg class a description was given last year. The Habsburg made 19·64 knots on her trials, with 14,942 I.H.P. The Arpad on the 27th of May maintained a mean speed of 19·65 knots during six hours; the maximum speed being 20·12 knots. The Babenberg, which is fitted with Belleville boilers and economisers, on her full speed trials at Pola on September 23, averaged 19·67 knots with 16,230 I.H.P. The contract speed was 18·5 knots. Battleships.

The battleship Erzherzog Karl was launched on October 4. She is of 10,403 tons displacement and 19 knots speed, with four 9·4 in as her heaviest guns. The turrets are turned, and the ammunition is hoisted by electric power. A sister ship, "B," will be launched shortly, and a third of the same type, "C," is projected. Cruisers.

The cruiser St. Georg, ex Ersatz Radetzky, was launched at the Government Yard, Pola, in December last. Displacement 7185 tons; speed, 21 knots, with 12,300 I.H.P.; armament, two 9·45-in. guns in turrets, five 7·48-in., four 5·9-in., and 25 smaller guns. The vessel has Yarrow water-tube boilers.

China.

Two gunboats, the Kien-Wei and the Kien-Gnan, of 875 tons displacement, were built at Foo-chow, and were to have been purchased by the French Government, but no action has been yet taken.

The small cruiser Huang-Tai was sunk near Hong-Kong by the Canadian Pacific Mail Steamer Empress of India. 170 men were saved, but the captain of the Huang-Tai and thirteen of the crew were drowned.

Denmark.

The smaller coast defence battleship Olfert-Fischer, of 3415 tons displacement, was launched on May 9. She is a sister ship to the Herluf Trolle, which has already been described in the *Naval Annual*.

The Iver Hvitfeldt, 3208 tons, built in 1886, and reconstructed in 1900, has been very seriously damaged by a fire which broke out in her bunkers.

Netherlands.

The small battleship Hertog Hendrik, which was laid down at Amsterdam in October, 1900, and launched in June, 1902, has been completed. She is sister ship to the Koningin-Regentes, 4872 tons displacement, and 16·5 knots speed.

Two other ships of the same class, but of slightly larger displacement, namely, 5295 tons, are under construction, the De Ruyter and the Tromp. The Tromp is to be completed during 1904.

The sea-going torpedo boats Sphinx and Minotaurus have been completed for service in the Dutch East Indies. They left on August 23 with the Python for Java.

The torpedo boat Fangha, of 128 tons displacement, attained a speed of 25 knots on her trials. The Smeroe and Wajang, of 24·5 knots speed, have been commissioned.

Peru.

The Peruvian river gunboat Loreto foundered off the Scilly Islands.

Portugal.

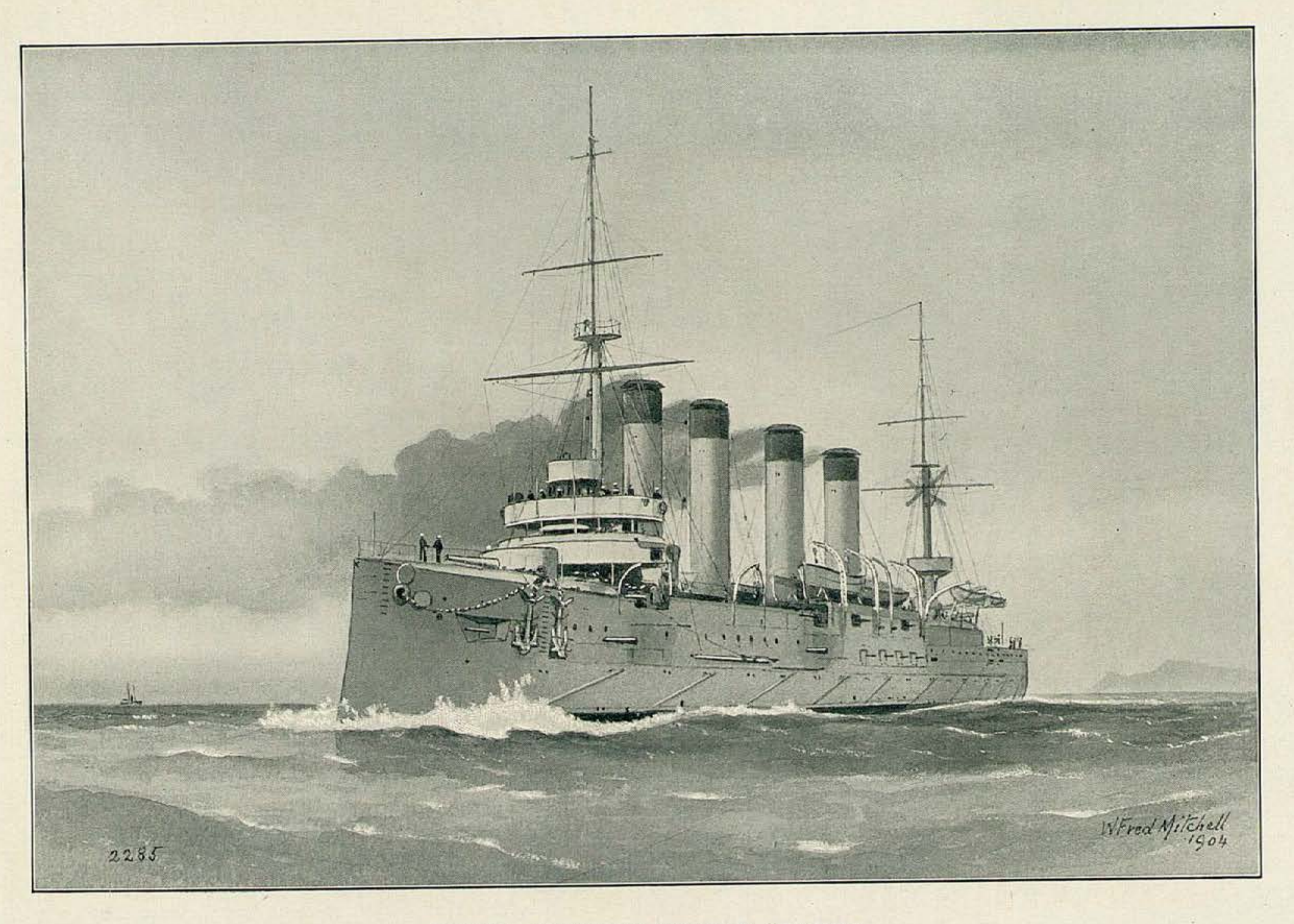
The estimates for 1903–4 amounted to about £700,000.

The small gunboat Patria, of 620 tons displacement and 15 knots speed, built by subscriptions from the Portuguese colony of Brazil, was launched at Lisbon on June 27. Length, 196 ft. 10 in.; beam, 27 ft. 6 in.; draught of water, 8 ft. 5 in. The propelling machinery consists of two triple expansion engines, which will develop 1800 H.P. The range of action will be 580 miles of economical speed.

The refit of the Vasco da Gama is nearly completed at Leghorn.

Spain.

The programme for the reconstruction of the Spanish fleet has been under discussion, but no action has been taken. The Cardenal Cisneros, which was launched in 1897, may, we believe, now be described as completed. In the light of experience gained in the war with the United States she has been modified in design. She is protected by a belt 278 ft. long and 5½ ft. in depth, which is 12 in. thick amidships. On the upper deck, instead of ten 5·5-in. guns mounted behind shields, she has eight 5·5-in. guns, all in 2¾-in. casemates. The 6-pdr. guns have been placed on the top of the amidships casemates. The heavy guns have 8-in. barbettes and 4-in. protection for the hoists. The engines, designed by Messrs. Maudslay, have been built in Barcelona. They are intended for 18 knots, with 10,000 I.H.P. natural draught, and 20·25 knots, with 15,000 I.H.P. under forced draught. The cruiser attained a speed of 20·7 knots at her trials.



RUSSIAN ARMOURED CRUISER "BAYAN."

Sweden.

The Swedish Navy Estimates for 1904 comprise a sum of £483,716 for shipbuilding. The battleship Oskar II, of the Tapperheten type enlarged (4203 tons), was laid down at the commencement of 1903. Speed, 18 knots, with 8500 I.H.P. She will be fitted with Yarrow large tube boilers. The armament comprises two 8·2-in. guns and eight 6-in. guns, mounted in pairs in four turrets at the angles of the superstructure instead of mounted in six turrets as in the Tapperheten.

The Manligheten, sister ship of the last-named, has been launched at Malmö. Her displacement is 3612 tons, and she carries the same armament, except that the 6-in. guns are six in number instead of eight.

Turkey.

The cruiser Abdul Hamid was launched at Elswick on October 25. The following description was given in the *Times*:—

This vessel is of the protective deck type, has a length of 340 ft., a breadth of 47½ ft., a mean draught of 16 ft., and a displacement of 3830 tons. She is constructed of steel, with a protective deck extending over her whole length 4 in. thick on the sloping parts and 1½ in. thick on the horizontal parts, and is fitted with numerous water-tight bulkheads extending to the upper deck. There is also a double bottom subdivided into a great number of water-tight compartments. The armament consists of two 6-in. q.-f. guns on upper deck, eight 4·7-in. q.-f. guns on upper deck, six 3-pr. q.-f. guns on bridges and hammock berthing, and six 1-pr. Two 18-in. training torpedo-tubes are also fitted on the main deck forward. The propelling machinery, now being constructed by Messrs. Hawthorn, Leslie & Co., at St. Peter's Works, is designed to develop 12,500 h.p., and consists of two sets of vertical triple-expansion engines, using steam of 210 lb. pressure generated in six cylindrical multitubular boilers. The speed guaranteed is 22 knots.

The Abdul Medjid, a sister ship, was launched at the yard of Messrs. Cramps, Philadelphia, on July 25.

Two destroyers have been completed by Messrs. Ansaldo, of Sestri Ponente, and seven more have been ordered.

Uruguay.

The gunboat General Rivera was blown up and sunk at Montevideo on October 8.

T. A. Brassey.
John Leyland.

CHAPTER II.

Prize-Firing and Naval Efficiency.

The importance of good shooting.

There is no more satisfactory feature in the recent history of the British Navy than the increased attention now devoted to that most important element of naval efficiency—good gunnery. A ship carrying only half the armament of her opponent is equal in offensive power, provided that her guns' crews are capable of hitting their mark twice as often in a given time. There is far greater discrepancy than this between the performances of different ships in the British Navy with the same description of gun. The figure of merit in 1902, with the 12-in. gun, for the Ocean was 70·13; whereas the figure of merit for the Albion, Formidable, and Hannibal was in each case below 20, that of the Formidable being only 4·12. Assuming for the guns' crews of secondary armament the same relative capacity to hit their mark as that of the guns' crews of the 12-in. guns, the Ocean would hit as often as three Albions and any number of Formidables. Looked at in this way, the real value of gunnery efficiency becomes apparent. It is also the teaching of history. The easy victory of the Shannon over the Chesapeake was due to the attention given by Captain Broke to the training of his crew in gunnery. The present President of the United States, in his admirable book on the war of 1812, points out that the capture of the Java and other British frigates by the Constitution and United States was as much due to the superiority of the crews of the latter as to their superiority in armament.

The present First Lord of the Admiralty has insisted more than once on the importance of gunnery. The present Board of Admiralty and its immediate predecessor have devoted serious attention to the subject, and, as a result, Lord Selborne was able, in the discussion in the House of Lords on the Navy Estimates for 1903, to state positively that the whole of the Navy, both officers and men, are striving to reach the highest standard. A brief review of the progress that has been made during the past five years would, therefore, seem not out of place in the *Naval Annual*.

Recent changes in training.

Speaking to the London Chamber of Commerce on March 14, 1902, Lord Charles Beresford told his audience that "shooting in the Navy is not what it ought to be because not enough trouble is taken." This reproach can now no longer apply to the gunnery schools at Whale Island, Devonport, or Sheerness, while the new regulations for the training of seamen and marines in gunnery and torpedo work, that came into force last December, have made training more syste-

matic. In the training ships the boys will be systematically taught gunnery, and for the first time the certificates they take with them to sea will state their shooting qualifications. They will be watched afloat, so that, if thought fit, they can be selected for training for the higher gunnery and torpedo ratings. The ordinary seaman-gunner's training will now be continuous, whether he is afloat or ashore, and good grounding acquired in the schools will not be allowed to rust. The congestion of the schools, which would have shortly entailed further heavy expenditure on barracks, will be relieved by only those men being retained for prolonged instruction who have qualified as seamen-gunners, and show marked proficiency. These picked men, after going through their further course, will, according to their qualifications, receive ratings as "gun-layers," "sight-setters," "turret gun-layers," "turret sight-setters," or "gunnery instructors." Thus the seamen and marine gunners in every ship in commission will be leavened with a quota of men whose natural aptitude for shooting has been developed by systematic and careful training.

Gun-layers and sight-setters.

Under the new scheme each gun-layer will be associated with a sight-setter, and they will be trained together in the gunnery school, and exercised generally until required for draft. Upon notice being given that a ship in the Fleet Reserve or a ship to be commissioned will require gun-layers or sight-setters, the requisite number of couples will be given special drill at the pattern of gun that they will find on board the ship to which they are detailed. If the type of gun requires a trainer as well as a gun-layer and a sight-setter, a seaman-gunner will be appropriated to each couple, and the trio thus formed will be thoroughly drilled before being drafted.

The above most important innovation was commented on by a naval officer, writing on the new scheme in the *Naval and Military Record* of December 31, 1903. He points out that the classification of seamen-gunners into gun-layers and sight-setters for turret guns and guns of the secondary battery will make it easier for the gunnery lieutenant to tell off men to the guns; and as these men will be specially trained, and trained together, at the particular class of guns they will fight in the ships they are drafted to, they will at once be ready to go into action if need be. Though the men of a gun's crew might never have worked together, though the gun-layer might have been trained in the Excellent, and the sight-setter in the Cambridge or the Sheerness Gunnery School, all would have been trained on the same system even if not exactly in the same way.

The utility of prize-firing.

The Admiralty have, till the most recent return, made the "Results of Prize-Firing in H.M. Fleet" a confidential document, and for information as to its results we were entirely dependent on what

leaks—and the leakage is considerable—through to the Press. Even now actual details as to the firing are only issued "confidentially." A return marked "for general information" merely gives a figure of merit to each ship, with nothing to show how such figure is arrived at. We believe that the publication of the prize-firing returns by the Admiralty is in the best interests of the service, and is, in any case, a great check on inefficiency.

As pointed out in the *Naval Annual* of last year, at a not very distant date "it was not unusual for flag officers to go ashore to get out of the firing; and if the gunnery lieutenant worried himself in the matter, it was looked upon as part of the eccentric behaviour natural to a man cranky on guns." But, as also pointed out, all that is now changed. Thanks to the action of the Admiralty, the speeches of the First Lord, and the efforts of the Press, public attention has been directed to the importance of good gunnery, and, as a consequence, the keenest spirit of emulation has been aroused between ships and squadrons. "Flag officers not only pay close attention to the practice, but new methods are constantly devised under their direction, in nearly all of which there is more supervision exercised over a ship's firing, the Commander-in-Chief very commonly going on board the ship that is practising, or placing his flagship so as to be in a position to judge of the accuracy, rapidity, and general efficiency of the fire." The publication of the returns of prize-firing will tend to maintain public interest in the question, even though the returns merely give a figure of merit to each ship, without showing how such figure is arrived at.

Standards for prize-firing.

In the reports of prize-firing which appear in the Press, three standards of comparison are used:—

(1) Percentage of hits to rounds fired. The objection to this standard of comparison is that it does not take into account the rate of fire. A ship whose guns' crews could fire five rounds and make four hits per minute would come out better than a ship whose guns' crews fired ten rounds and made seven hits; but the latter would silence the enemy much sooner than the former.

(2) Hits per gun per minute. This is the best standard of absolute efficiency, but it is only good for comparison between ships carrying the same type of guns and mountings.

(3) Average relative result per gun. This is the best method for comparing ship with ship, if it were possible to fix the standard satisfactorily. At present it varies from year to year. If, as appears to be the case, the standard is based on the previous year's practice, a gun that makes bad shooting one year has a low standard the next, and it is easy to reach a high figure of merit with that gun; whereas

a gun that shoots well one year has a high standard the next. This is, to a great extent, the explanation of the high figure of merit attained by the Grafton and Blenheim in 1902 (cf. below), as compared with the Aboukir and her sister-ships. The following is a further illustration of the difficulty of comparing results:—

In 1902 the standard for 12-in. guns may be 24 hits, and a ship that makes that number of hits has a figure of merit of 100. In 1903 the standard may be raised to 33 hits, and a ship making the same number of hits as in 1902 has a figure of merit of only 72. The figures of merit of one year cannot, therefore, be compared with those of another, the standards being different.

The prize-firing target.

A further difficulty, in instituting comparisons between different years, is that the prize-firing conditions are altered. The target that has been used in prize-firing in the Royal Navy up to now is a raft with three masts having canvas stretched between. The distance between the mast is 10 feet, the height of the mast 16 feet, therefore the square area of the canvas screen thus upheld is 20 by 16 feet, or an area of 320 square feet. This is the target for 4·7-in. and 6-in. guns. When turret and barbette guns, the 9·2-in. guns and above are shooting, the area of the target is increased by the addition of triangular jibs to the centre target area, which increase the base width of the latter from 20 to 60 feet. The actual length of the raft which floats the canvas screen is 45 feet, and when the jib-shaped wings are added to the central target the area of target at which the large calibre guns fire is increased from 320 to 640 feet. This target when towed to its position is moored so that it will always lie in the same direction and broadside on to the ships engaging it. Three buoys are then laid out 800 yards apart from each other, the centre buoy directly abeam of the target's centre. This gives the ship a run of 1600 yards between the two outer buoys. The guns are fired singly, and the "time allowance" is twelve minutes for the older types of heavy calibre guns—*i.e.*, 8-in. to 16·25-in.: six minutes for the 4-in., 5-in. B.L. guns, and modern marks of 12-in. and 9·2-in.; and two minutes for the 4-in., 4·7-in., and 6-in. Q.F. guns. Heretofore, the ship making the run for firing came into action at about 1700 yards, when she opened fire after passing the first buoy. She was at about 1400 yards when passing the centre buoy immediately abeam of the target, and passed off the run firing at the same range as when she entered it Of late, however, the ranges have been increased. For this reason the target has been increased to 30 feet in length and 20 feet in height, or a superficial area of 600 square feet. To enable the gun-layer to watch the result of his shot six-power telescopes are

to be supplied in lieu of three-power for the telescopic sights. The use of a "spotter" who informs the gun-layer of the results of his shot is now prohibited for prize firing, but permitted for long-range firing. The reason for stopping this aid at prize firing is that the competition should be between guns' crews, and there is no real test of gun-laying unless a man watches his own shots and corrects the errors he makes. The target mentioned above compares with one 17 feet by 21 feet used in the United States at a 1700 yards range.

Emulation as a factor.

The following are the results of prize-firing in H.M. Fleet from 1898 to 1901:—

	1898	1899	1900	1901
Number of hits . . .	2527	2831	2732	3562
Number of misses . .	5463	6249	5709	6244
Percentage of hits to rounds fired . . .	31·6	31·1	32·3	36·3
Percentage of hits to rounds fired by best ship	70	80	76·8	80

From the above table it will be seen that there has been a steady, if not very great, improvement in the gunnery of the Fleet as a whole; but the results attained by the best ship, which are of the highest value as setting a standard to the whole Navy, are good. To those who argue that record firing is no indication of all-round proficiency, it may be pointed out that every record made in any calibre of weapon, whether for rapidity or accuracy of fire (and both are essential), gives other ships a lead to equal. With every man in the Fleet, from First Sea Lord down to seaman-gunner, having these records before him as proofs of what it is possible to achieve, the general standard of gunnery is bound to grow daily nearer to the best possible of achievement.

The return for 1899 classified.

The following table, giving the complete returns of the Fleet for 1899, is compiled from a return which appeared in the *Rivista Marittima* of Rome, and was from there copied into the "Notes on Naval Progress" issued by the Intelligence Department of the United States Navy:—

RETURN OF PRIZE FIRING FOR 1899.

	Rounds.	No. of Hits.	Percentage of Hits.
13 Battleships, 13·5-in. and 16·25-in. (*a*) .	252	84	33·3 (*a*)
9 Battleships, 12-in. (*b*)	187	63	33
5 Battleships, 10-in. (*c*)	185	63	34
14 Cruisers, 9·2-in. and 8-in. (*d*) . . .	288	100	34·7
40 Cruisers, 6-in. Q.F.	2347	664	28

(*a*) Nile, 61 per cent., best score; Sans Pareil, 12·5 per cent., poorest score. The percentage for these guns was in the previous year 29·96.

(*b*) Illustrious, 55 per cent., best score; Magnificent, 11·7 per cent., poorest score.

(*c*) The Thunderer, with four 10-in., fired 47 rounds in 12 minutes, and made 27 hits. The Barfleur, with the same number of guns, fired 24 rounds in 12 minutes with only four hits.

(*d*) With 9·2-in., Royal Arthur, 25 per cent.; Theseus, 15·3 per cent.; with 8-in., Severn, 14·3 per cent.; Magdala, with four 8-in. guns, fired 38 rounds in 12 minutes, and made 13 hits.

From this return it will be seen that the heavy gun firing from the battleships was very markedly ahead of the firing from the forty cruisers using the 6-in. Q.F., more so than it should be even when we allow for the fact that a big battleship is an infinitely steadier gun-platform than a second-class cruiser.

In 1899 the following were the best results in the Mediterranean Fleet, and for each gun the best and the next best ships are given:— The Mediterranean Fleet in 1899.

	Type of Gun.	Percentage of Hits.
Revenge	13·5-in.	53·8
Ramillies	13·5-in.	50
Illustrious	12-in.	55
Cæsar	12-in.	52
Empress of India	6-in. Q.F.	46·9
Scylla	6-in. Q.F.	45
Scylla	4·7-in. Q.F.	80
Vulcan	4·7-in. Q.F.	51

Here, then, the records are 53·8 per cent. with the 13·5-in., 55 per cent. with the 12-in., 46·9 per cent. with the 6-in., and 80 per cent. with the 4·7-in. The Scylla's record was a phenomenal one at the time, inasmuch as it showed what could be done in the direction of improving gunnery by scientific and systematic training. The ship shot under weather conditions not of the most absolutely favourable, and yet was able to score 56 hits out of 70 rounds fired.

The following return for the Channel Squadron in 1900 was published in the *Times*:— The Channel Squadron in 1900.

12-in. Gun.

	1899		1900.	
	Rounds.	Hits.	Rounds.	Hits.
Prince George	18	7	23	7
Mars	25	5	25	6
Hannibal	27	6	18	5
Jupiter	21	8	16	4
Magnificent	17	2	19	2
Majestic	20	3	28	12
6-in. Q.F. Gun.				
Prince George	100	20	93	52
Mars	80	19	95	27
Hannibal	104	19	79	27
Jupiter	98	27	106	44
Magnificent	102	32	87	30
Majestic	97	28	108	52
Resolution	79	22	76	31
Repulse	73	26	72	27

The only ship that more than doubled her previous record was the Majestic, which in 1899 made three hits in 20 rounds, whereas this year she scored 12 hits for 28 rounds. Much of the credit for this performance is due to the captain of the starboard after turret gun, who fired five rounds in three minutes, this being half the prescribed time, and each round hit the target.

It will thus be seen that whereas in 1899 the eight battleships fired 733 rounds and made 193 hits with the 6-in. Q.F. gun, in 1900, in 716 rounds they made 290 hits. From the return, as a whole, it is satisfactory to find that, whereas in 1900 the average rounds per gun per minute were 3·89 with 1·58 hits per minute, the respective figures in 1899 were 3·98 and 1·05.

The record prize-firing in 1900.

The feature of the year 1900 was the firing of the Terrible. As Captain Scott had, in the Scylla, taught his men to beat all records with the 4·7-in., so in the Terrible he trained them to show what could be done with the 6-in. The following is an abstract of the results of the Terrible's prize-firing, and a comparison of her practice with the 6-in., as against the average throughout the Service :—

Gun.	Rounds per gun per minute.	Hits per gun per minute.	Percentage of hits to rounds fired.	Time required to make one hit.	Weight of metal hitting per gun per minute.
				minutes.	lbs.
9·2-in. Mark VIII. . .	1·16	0·75	60	1·3	285
6-in. Q.F.	4·3	3·33	77	0·3	333
Average figures for 6-in. Q.F. throughout the Service	3·8	1·07	28	0·9	107

Note.—The actual number of rounds fired with the 6-in. was 104, the actual hits being 80, or 76·8 per cent. With the 9·2 she fired 15 rounds, securing nine hits.

The prize-firing of 1901.

The return of the prize-firing, showing the percentage of hits per gun per minute in 1901, 1900, and 1899, was reprinted from the *Times* in last year's *Annual* (p. 16), and commented upon (pp. 401, 402), but we may here quote some further comment on it made in a letter from Captain H. E. G. Clayton, R.E., which appeared in the journal of the Royal United Service Institution for December, 1902. Captain Clayton, like the writer in last year's *Annual*, does not agree with the criticism of the *Times* correspondent, and says :—

To give some instances :—The *Times* expert, criticising the shooting of the 6-in. B.L. guns, says: "But if high results cannot be expected from the gun, the averages of the three years do not indicate improved training." Such trifling differences in the numbers of hits per gun per minute may be entirely due to weather or to the wearing of the guns, and there is probably no deterioration in the training, as is more than hinted at in the *Times* expert's remarks. Moreover, it is hardly natural to expect that there will be much improvement in the training of such a relatively unimportant portion of the fleet as that constituted by the ships mounting the 6-in. B.L. gun, whereas it is evident that there is a considerable improvement in the training of that very important portion of the fleet constituted by the ships mounting the 6-in. Q.F. gun.

The same remarks apply to the criticism on the shooting of the 5-in. and 4-in. B.L. gun; moreover, the deterioration in the shooting of these guns, if any, may be due to the average size of the ships carrying these guns having decreased considerably of late years. Again, as regards the criticism on the firing of the 4·7-in. Q.F. guns, the percentage of hits per gun per minute is obviously brought down by the number of small craft carrying these guns. It is obvious even to the uninitiated that, other things being equal, the larger the ship the better gun platform she is, and the better the shooting from her guns. No doubt the Admiralty returns lump all craft together, but the firing of the torpedo-gunboats and other small craft carrying the 4·7-in. must

bring down the average of the fleet as a whole immensely. What is the good of comparing the shooting of the Jaseur and Barfleur, for instance? It is obvious that shooting results should be classified by the size of the ships mounting the guns concerned, as well as by the calibre of the guns. Then really fair statistics would be arrived at, much to the benefit of all concerned.

The record shooting for 1901.

In 1901, as in 1900, the feature of the year was the shooting of the Terrible, still in commission under Captain Percy Scott, thus affording ample proof that this officer had brought the training of guns crews to a fine art. The analyses of the firing for the 6-in. gave an average of hits of 80 per cent. and an average of 5·3 rounds with 4·2 hits per minute. For the 9·2-in. the percentage of hits was 64, and the rate of firing 1·10 rounds, with 1·1 hits per minute. It is, however, in the proof that proper training could develop the personal skill, that the interest of the Terrible's shooting lies. Ten men at the 6-in. guns, five number ones and five number twos, hit with every round they fired. Heading the list and establishing a record for the gun was Petty Officer Grounds, whose record was eight shots and eight hits in the minute. Of the other nine men, two made six shots and six hits in the minute, five did five, one four, and one three. With the 9·2-in., Petty Officers Taylor and Kewell scored nine hits out of twelve rounds. When we remember that the Fleet average for 6-in. guns was 1·1 per minute, it will be seen that the Terrible's men used their 9·2-in. as rapidly as the other ships used their lighter weapon.

The Scylla in 1889 made 80 per cent. of hits with two 4·7-in. guns and an average of 4·6 hits per gun per minute. This record was now to be beaten by the Barfleur, which, like the Terrible, was on the China Station, and whose captain had closely adopted Captain Scott's methods of training. Firing 159 rounds she made 114 hits, a lower average than that of the Scylla, but the rapidity of fire was increased to an average of 5·7 hits per minute. In the larger calibre guns also the finest shooting was made on the China Station—the Ocean with 14 hits out of 26 rounds making a percentage of 58, as against 33, the fleet average for the same weapon.

The prize-firing for 1902.

In publishing the results of the annual prize firing for the year 1902, the Admiralty for the first time circulated a return for general information, though, as has already been pointed out, it gives no precise details as to the firing. The fact that a return not classed as "confidential" is now issued gives reason to hope that before long the complete returns of the prize firing of H.M. Fleet may be regularly laid upon the table of the House of Commons, and so become available to the general public in the shape of a "Parliamentary Paper." The return is an interesting one, for instead of giving the results by stations, the grouping is now into ships using the same calibre or type of weapon. It is therefore more easy to compare the

relative efficiency of vessels that are either sister ships, or are of the same class and akin in armament. The following table, taken from the *Times* of November 3rd, 1903, gives only the ships taking first, second and, in some cases, last places in order of merit :—

Order of Merit.	Ship.	Station.	Type and Mark. Mounting.	No. of Guns.	Average relative results per Gun.
		16·25-IN. AND 13·5-IN. B.L. GUNS (12 VESSELS).			
1	Hood. . . .	Mediterranean . .	Turret . .	4	88·35
2	Ramillies . .	,, ,,	Barbette .	4	48·58
Last	Empress of India	,, ,, . .	,, .	4	13·25
		12-IN. B.L., MARKS VIII. AND IX., GUNS (19 VESSELS).			
1	Ocean . . .	China	B. III. . .	4	70·13
2	Bulwark. . .	Mediterranean . .	B. VI. . .	4	61·88
Last	Formidable . .	,, ,, . .	B. VI. . .	4	4·12
		12-IN. B.L., MARKS I. TO VIII., GUNS (1 VESSEL).			
1	Collingwood. .	Home	Barbette . .	4	17·64
		10-IN. B.-L. GUNS (2 VESSELS).			
1	Renown . .	Mediterranean . .	B. III. . .	4	23·25
2	Sans Pareil. .	Home	V.C. P. . .	1	23·25
		9·2-IN. B.L., MARKS VIII. AND X., GUNS (4 VESSELS).			
1	Aboukir . . .	Mediterranean . .	Hyd. V. . .	2	75·55
2	Cressy . . .	China	Hyd. V. . .	2	35·55
		9·2-IN. AND 8-IN. B.L. GUNS (EXCEPT 9·2-IN. MARKS VIII. AND X.) (9 VESSELS).			
1	Crescent. . .	North America and West Indies . .	V.C. P. III. .	1	113·20
2	Grafton . . .	Pacific	V.C. P. III. .	2	62·89
Last	Royal Arthur .		V.C. P. III. .	2	25·15
		6-IN. B.L. GUNS (1 VESSEL).			
1	Sphinx . . .	East Indies . . .	A.B.	1	14·28
		6-IN. B.L. VII. GUNS (7 VESSELS).			
1	Bulwark. . .	Mediterranean . .	P. III. . .	12	84·22
2	Implacable . .	,, ,, . .	P. III. . .	12	73·30
Last	Cressy . . .	China	P. IV.. . .	12	22·75
		6-IN. Q.F. GUNS (48 VESSELS).			
1	Ocean . . .	China	P. II. . . .	12	102·73
2	Crescent. . .	North America and West Indies . .	C.P. I. . .	12	92·20
		6-IN. Q.F.C. GUNS (13 VESSELS).			
1	Cossack . . .	East Indies . . .	V.C. P.I.C. .	6	67·23
2	Phaeton . . .	Pacific	2 V.B. II. C. 4 V.B. III. C. 4 V.C. P.I.C.	10	57·45
		5-IN. AND 4-IN. B.L. GUNS (10 VESSELS).			
1	Basilisk . . .	South-East Coast of America . . .	5-in. V.C.P. .	8	50·96
2	Rattler . . .	Cape of Good Hope.	4-in. V.C.P. .	6	45·92
		4·7-IN. AND 4-IN. Q.F. GUNS (62 VESSELS).			
1	Forte . . .	Cape of Good Hope .	P. III. . .	8	76·93
1	Fox	East Indies . . .	P. III. . .	8	76·93
3	Cambrian . .	South-East Coast of America. . . .	P. III. . .	8	74·76
		4-IN. Q.F.C. GUNS (1 VESSEL).			
1	Lapwing . .	East Indies . . .	V.C. P.C.. .	6	29·66

The objections to a return based on the average relative results per gun have already been stated. With a variable standard it is impossible to compare one year with another. It is, however, possible to compare the shooting of different vessels using the same type of gun. It is evident from this return that there is considerable room for improvement in the all-round shooting of the Fleet. The difference between the best and the worst shooting with each type of gun is enormous, even making full allowance for the chances that must affect firing, such as weather conditions and the fact that sights are very frequently defective. For example, in the shooting with the 16·25-in. and 13·5-in., ten of the twelve ships firing failed to reach an average result per gun of 40, and six ships did not even reach 25. While the Hood could attain to a figure of 88·35, the Empress of India, with the same gun, could only reach to 13·25. In the 12-in. gun, again, the figure of merit for the first eight ships ranges from 41·25, in the case of the Mars, to the 70·13 of the Ocean. The next eight range between the 20·62 of the Jupiter to 37·12, the figure reached by the London, Prince George, and Victorious. Three ships are below 20—the Albion, Hannibal, and Formidable. The figure for the latter ship, indeed, is only 4·12, a sign that there was something radically wrong somewhere. With the 9·2-in. Mark VIII., it is remarkable that while the Crescent could attain to a figure of 113·20, her sister ship, the Royal Arthur, could not reach a higher figure than 25·15 Of the shooting with the 6-in. Q.F. (including the 6-in. B.L. Mark VII., practically a Q.F. gun) the record is a very fair one. Fifty-six ships (eight using the Mark VII. gun) make returns. Of these, eight reach a figure of 70 and upwards; seventeen are between 50 and 70, twenty-one between 25 and 50, and only ten fall below 25. With the 4·7-in. and 4-in. the shooting is not so good, but of course a number of the small craft carrying these weapons, T. G. B.'s for example, are by no means good gun platforms. The highest figure, 76·93, is attained by the Forte and Fox, and only five ships of the sixty-five that make returns reach to 70. Seven make between 50 and 70, and twenty-five between 25 and 50. Here again are some glaring discrepancies in ships of the same type. The figure of the best torpedo gunboat, the Jason, was 34·69. Her sisters, the Hebe and Skipjack, only reach 4·33, while the Gleaner, Renard and Speedy apparently never hit the target at all. The Tribune scored 73·72, the Melampus only 5·81. Nine third-class cruisers of the Pelorus class fired. The Pomone showed a figure of merit of 69·38, the next best, the Pegasus, was 42·23, and the Prometheus and Pactolus could only attain to 16·21 and 15·17 respectively.

The record firing of 1902.

As regards the best records of individual ships the palm is taken by the Ocean, for not only does she head the 1902 list in the return for both the 12-in. and 6-in. guns, but in addition Gunner Francis Skein, R.M.A., captain of a 6-in. gun, beats the Terrible's previous record by firing nine rounds in one minute, and getting every projectile home upon the target. A record was also established with the 12-in. gun. With the 12-in. the Ocean's "average result per gun" comes to the high figure of 70·13. In all she fired 25 rounds, making 17 hits, a percentage of 68 hits to rounds fired. Her rate of firing was 1·0 per minute, and her rate of hitting 0·54, this as against 0·88 round with 0·27 hit per minute, the average for the whole Navy for the three previous years with this type of gun. She thus with this gun beat the record which she herself held, of 26 rounds with 14 hits. With the 6-in. gun her score was simply phenomenal, for not only did Gunner Skein establish the record above quoted, but with a rate of fire of 6·8 rounds per minute per gun she scored 4·87 hits. In the return for the 13·5-inch (which includes also the Benbow and Sans Pareil, each of which carries two 16·25-in., the only guns of this type now mounted afloat), the Hood heads the list with the "average result per gun" of 88·35. With the 6-in. also her performance was of a very high character, for she figures fourth of the forty-eight ships in the list, her average being 83·24. With the 12-in. she scored 20 hits out of 34 rounds, a percentage of 58·8, and her rate of fire amounted to 0·70 round per gun per minute, with 0·42 of hits per minute per gun. Thus she averaged 5 hits in twelve minutes from each 13·5 gun, as against the record hitherto existing of 3·5 hits in the same time. The Hood again fired 34 rounds in her 12 minutes' run, as against the best previous record in the same calibre of gun of 28. Finally the Crescent not only tops the list of ships armed with the 9·2-in. with the high "average" of 113·20, but established a new record by scoring 9 hits in ten rounds, her rate of firing being 0·83 round per gun per minute, with 0·75 of hits.

The latest record shooting.

For 1903 the official return has just been issued, but some additional particulars from the principal stations may be given. The most noticeable feature of the year is the establishing of a new record for the 6-in. Q.F. on board the Ariadne, the flagship on the North America and West Indies Station. This feat was achieved by P.O. 2nd Cl. W. Rowe, who in his time allowance of one minute fired ten shots and got ten projectiles home on the target. The second captain of the gun, J. Wyatt, A.B., was on the road to rivalling his comrade's score, when some hitch occurred in the training gear, and he was only able to achieve four hits in five rounds. Some very good individual shooting was also made on other stations.

With the 6-in., in runs of two minutes, Sergt. Berry, R.M.A., of H.M.S. Albion, scored 14 hits out of 15 rounds fired; and P.O. 1st Cl. J. Bristow, of H.M.S. London, secured 12 hits in 14 rounds. In one minute runs several individuals scored 5, 6, and 7 rounds and hits, and P.O. 1st Cl. T. Barrett, of H.M.S. Implacable, very nearly tied Rowe's record by scoring 9 hits out of the 10 rounds he was able to fire in the time limit. With the 4·7-in. in a two minutes' run, P.O. 2nd Cl. G. Tyrrell, of H.M. Charybdis, fired 16 rounds and scored 14 hits.

The following table, showing the firing results of some of the ships on the China Station, is taken from the *Naval and Military Record*, and is ample proof that that station well maintains the high record that it has always held for gunnery:—

	Gun.	Rounds.	Hits.	Percentage.
Albion	12	26	18	69·23
"	6	149	95	63·75
Goliath	12	24	15	62·5
"	6	160	97	60·62
Ocean	12	28	18	64·29
"	6	107	73	68·22
Cressy	9·2	26	12	46·15
"	6	129	68	52·71
Eclipse	6	52	19	36·53
"	4·7	86	39	45·34
Pique	6	16	6	37·5
"	4·7	81	41	50·61
Bramble	4	32	20	62·5

The Ocean's record was made with a crew only three months in commission, and under unfavourable weather conditions.

In the following table is given an abstract of the returns that have been made public from the Mediterranean Station, as well as a comparison between 1902 and 1903:— Mediterranean Fleet.

Calibre and Mark of Gun.	1903.					1902.				
	Number of Guns.	Rounds.	Hits.	Average per Gun per Minute.		Number of Guns.	Rounds.	Hits.	Average per Gun per Minute.	
				Rounds.	Hits.				Rounds.	Hits.
13·5-in. . . .	8	40	11	·41	·11	12	82	37	·57	·26
12-in., Mark VIII. and IX.	44	241	107	·91	·40	40	239	94	·99	·39
10-in. . . .	4	33	20	·69	·42					
9·2-in. . . .	4	60	32	2·5	1·33					
6-in., Mark VII.	108	1163	701	5·38	3·24	72	745	412	5·17	2·86
6-in. Q.-F. . .	95	905	488	5·03	2·71	131	1258	692	4·80	2·64
6-pdr. (TBDs) .	120	1228	168	10·23	1·40	90	1016	142	11·29	1·58
Machine guns .	52	8512	936	163·7	18·0	87	21,526	3663	247·4	42·2

This table shows no very marked improvement on the 1902 shooting except with the 6-in. Mark VII. Here the rapidity of fire per gun per minute has remained practically constant, 5·38 as against 5·17 in 1902, while the rate of hitting has increased from 2·86 to 3·24. In accuracy of firing with their main armament the battleships of the squadron come out as follows:—

Ship.	Rounds fired.	Hits.	Per cent. of hits.	Average per gun per minute.	
				Rounds.	Hits.
Formidable	22	14	63·64	·92	·58
Venerable	23	14	60·43	·96	·58
Cæsar	15	9	60·00	·62	·37
Bulwark	30	15	50·00	1·25	·63
Russell	20	9	45·00	·83	·37
Irresistible	25	11	44·00	1·04	·46
Vengeance	19	8	42·10	·79	·33
Victorious	20	7	35·00	·83	·29
London	24	8	33·33	1·00	·33
Illustrious	16	5	31·25	·66	·21
Implacable	27	7	25·92	1·12	·29

With the Mark VII. 6-in. gun the results were as follows:—

Ship.	Rounds fired.	Hits.	Per cent. of hits.	Average per gun per minute.	
				Rounds.	Hits.
Russell	118	90	76·27	4·92	3·75
Formidable	137	89	64·96	5·71	3·71
Venerable	107	66	61 68	4·5	2·77
London	146	90	61·64	6·05	3·75
Irresistible	122	74	60·65	5·08	3·08
Bacchante	100	60	60·00	4·17	2·5
Implacable	127	76	59·84	5·29	3·16
Bulwark	176	98	55·68	7·33	4·08
Aboukir	130	58	44·62	5·42	2·42

The Formidable, which had in 1902, with an "average relative result per gun" of only 4·12, the worst record in the Navy with the 12-in. (Mark VIII. and IX.) gun, probably owing to defective sights, now heads the list. In one run of three minutes P.O. 1st Cl. Lowe fired 4 rounds with 4 hits in the first half of the run, and in the second half of the same run his opposite number, P.O. 1st Cl. Cross, scored 3 hits with 3 rounds, making a total of 7 rounds and 7 hits in the three minutes. Her shooting with the 6-in. was also very good, for she made 89 hits out of 137 rounds, giving her a percentage of 64·96. For rapidity of fire the Bulwark made a record, and was at the top both with the 12-in. and 6-in. With the

former she got in her 30 rounds at the rate of 1·25 rounds, with 0·63 of hits per minute. With the latter she averaged 7·33 rounds with 4·08 of hits to the minute.

In the Channel the scores made were as follows:— Channel Fleet, 1903.

Ship.	Gun	Rounds fired.	Hits made.	Average hits per gun per minute.
Majestic	12-in.	37	24	1
,, ...	6-in.	154	88	3·67
Magnificent	12-in.	30	16	0·67
,, ...	6-in.	112	50	2·08
Hannibal	12-in.	27	16	0·67
,, ...	6-in.	112	68	2·83
Jupiter	12-in.	32	11	0·46
,, ...	6-in,	125	59	2·37
Mars	12-in.	31	16	0·67
,, ...	6-in.	146	63	2·62
Doris	6 in.	116	45	2·05
Hogue	9·2-in.	31	20	1·7
,, ...	6-in.	110	50	2·08

In the above return the most noticeable feature is the shooting made by the Majestic with the 12-in. Her score of 24 hits to 37 rounds, an average of 64·86, establishes the record for this calibre of gun. If the standard in 1903 had been the same as in 1902 the Majestic's figure of merit would have been 100. Therefore the Majestic's shooting in 1903 was far better than would appear from the figures given above. The Admiralty award figures of merit without explanation, the standard varies from year to year, and is apparently based on the previous year's practice. As far as can be judged the standard for four 12-in. guns in 1902 was about 24 hits, so that a ship that got 24 hits would have an "average relative result" per gun of 100. Now in 1903 the standard appears to have been raised to nearly 33 hits, so that a ship which actually got in 24 hits—the Majestic—only scores 72. If, however, we bear in mind that the standard is being raised we can judge the very marked improvement that has taken place in the shooting of the squadron of which Lord Charles Beresford assumed command close on 12 months ago:—

Ship.	Average relative result per gun.			
	12-in.		6-in.	
	1902.	1903.	1902.	1903.
Majestic	49·5	72·3	61·4	67·7
Hannibal	12·4	50·3	47·4	52·3
Mars	41·2	50·3	55·3	48·5
Magnificent	29·5	50·3	58·8	38·4
Jupiter	20·6	34·6	43·9	45·4

From this return it will be seen that every ship shows steady improvement with their main armament, but it is only fair to state that previous bad results have been attributed in part to defective sights. With the 6-in. guns there is also a steady improvement except in the case of the Mars and Magnificent. For both ships, however, there is reasonable excuse. In the case of the Mars the buoys and targets were continually shifting owing to sea and tide, while she had three missfires. The Magnificent also had three guns delayed by missfires or accidents. With the 6-in. B.L. VII., the Doris dropped her figure of merit from 54·19 in 1902 to 41·7 last year, but she also was unlucky, for she had four missfires and one tube chamber choked. There are too many instances of missfires during peace practice, and they ought to be sensibly reduced if ships are to be taken into action with confidence. Finally, the Prometheus and Pactolus, firing the 4-in. Q.F. raised their figure of merit respectively from 16·21 to 36·9, and from 15·17 to 25. In fact the vast improvement made in twelve months is a credit to all concerned, and the more so when we remember that the Channel is always more or less of a sea-going training squadron. The only reservation we have to make is the criticism concerning missfires, and a caution that the figure of merit for each type of gun varies according to the performances of the previous year.

Conclusion. In conclusion, the object of the foregoing has not been to criticise the system of prize-firing, but to enable the reader to draw his own deductions as to how far prize-firing tends to promote all-round efficiency in gunnery. It can hardly be denied that the spirit of emulation aroused is of the highest value. Although the high all-round standard the Service wishes to attain has not been reached, there has been and continues to be steady improvement, and in the Results of Prize-Firing for 1903, issued on February 9, it is said: "Their Lordships have noted with satisfaction the improvement in shooting with nearly all classes of guns." In reply to the frequent criticism that prize-firing is not carried on at the ranges that would certainly rule under war conditions, it may be observed that the ranges have of late been very markedly increased, that the object of prize-firing, as apart from all other gunnery practice, is to keep keen the interest of the men in shooting, and to draw out individual talent and aptitude, and that this would not be done if prize-firing was carried out at ranges at which the men could not mark the direction of their shots. More attention is required to the sighting of guns, for we are confident that if the best sights and telescopes are obtained, the men can soon be taught to use them, and the efficiency of the ships will thereby be enhanced.

CHAPTER III.

British Naval Manœuvres in 1903.

Though the manœuvres of 1903 were unusually short in duration, yet they were of quite exceptional interest alike in respect of the number of ships engaged and in respect of the wide area over which the operations extended. The whole of the Mediterranean, Home, and Channel Fleets took part in the operations, together with the Cruiser Squadron and sixteen additional cruisers, either commissioned or fully mobilised for the occasion. When the fleets assembled in Lagos Bay the flags of eight Admirals were displayed simultaneously, the fleets being disposed in eight lines, each headed by a flagship. The scheme of operations was defined as follows :— Character of the operations.

General Remarks.

The manœuvre area is unrestricted except as regards the territorial waters of France and Spain, His Majesty the King of Portugal having given permission for the use of his territorial waters for manœuvre purposes.

The manœuvre fleets will be known as B fleet and X fleet, the former being divided into B 1 and B 2. The composition of the fleets will be approximately as shown on attached list.

There will be no opportunities for battleships to coal during the operations. X cruisers may fill up with coal at Gibraltar at any time, and B cruisers at Madeira.

The two fleets will be distinguished from each other by the ships of B fleet keeping two "not under control" balls hoisted vertically on the triatic stay about half-way between the fore and main masts, night and day.

As these balls are intended to provide means for mutual identification at a distance between the vessels of the opposing sides, such as would naturally be the case between the vessels of hostile nations in war, these distinguishing balls are on no account to be hoisted by any vessel belonging to X fleet, nor hauled down at any time by those of B fleet.

B 1 fleet is concentrating in the Channel ports, England and Ireland being B territory.

B 2 fleet is concentrating at Madeira, which is also B territory.

X fleet is concentrating at Lagos, which, together with the coast of Portugal and Gibraltar, is X territory.

General Idea.

The contest for the command of the sea between the two maritime countries B and X has been in progress for some time.

In the waters approximately between Gibraltar and Madeira X has been victorious, and B driven, with loss, into his defended port at Madeira.

In northern waters, however, B has so effectually disposed of the enemy's fleet that he is able to despatch a force (B 1) to the South for the purpose of combining with his available forces at Madeira (B 2), and then engaging X, known to be concentrating at Lagos.

The Admiral in command of B 1 has given his junior, the Admiral commanding B 2, the necessary instructions by cable.

The Admiral commanding X fleet, while still preparing for sea at Lagos, hears from reliable sources by cable that three squadrons belonging to B have sailed from their home ports, Berehaven and Portland, obviously with the intention of joining at sea, and effecting a junction further south with the fleet known to be preparing for sea at Madeira.

X battleships are ready for sea twenty hours after B 1 has sailed, and X has had reliable information that B 2 battleships are at that time still refitting.

Both X and B 2 cruisers are, however, ready for sea at the time when B 1 fleet sailed, *i.e.*, 8 a.m., 5th August.

Composition of the fleets.

The following was the composition of the fleets :—

B FLEET.

VICE-ADMIRAL SIR A. K. WILSON, V.C., K.C.B.

B 1 FLEET.

Battleships.	*Cruisers.*
Revenge (*Flag*).	*Good Hope* (*Flag*).
Empress of India (*Flag*).	*Drake.*
Royal Oak.	*Sutlej.*
Royal Sovereign.	*Hogue.*
Hood.	*Edgar.*
Benbow.	*Hawke.*
Sans Pareil.	*Dido.*
	Venus.
	†*Melampus.*
	†*Latona.*
	†*Apollo.*
	†*Andromache.*
	†*Æolus.*
	Medea.
	Medusa.

B 2 FLEET.

Battleships.	*Cruisers.*
Majestic (*Flag*).	**Europa.*
Magnificent (*Flag*).	*Doris.*
Mars.	*Hermes.*
Jupiter.	*Minerva.*
Hannibal.	*Rainbow.*
Prince George.	†*Sappho.*
Repulse.	*Prometheus.*
Ramillies.	

X FLEET

ADMIRAL SIR COMPTON DOMVILE, G.C.V.O., K.C.B.

Battleships.	*Cruisers.*
BULWARK (Flag).	BACCHANTE (Flag).
VENERABLE (Flag).	*KING ALFRED.
LONDON.	ABOUKIR.
FORMIDABLE.	*POWERFUL.
IMPLACABLE.	*IMPERIEUSE.
IRRESISTIBLE.	*DIADEM.
RUSSELL.	*SPARTIATE.
EXMOUTH.	*BLAKE.
CÆSAR.	DIANA.
ILLUSTRIOUS.	GLADIATOR.
RENOWN.	VINDICTIVE.
	HERMIONE.
	NAIAD.
	INTREPID.
	*IPHIGENIA.
	†SPARTAN.
	*SCYLLA.
	PANDORA.
	PIONEER.
	PYRAMUS.
	PEGASUS.

The situation considered,

The situation defined in the General Idea presupposes a state of war, in which much has already happened, though the command of the sea is still in dispute between the two belligerents. There is no limit to the field of operations, except the territorial waters of neutral powers; but a consideration of the positions assigned to the contending fleets and of their available coal supply, will show that the area of effective conflict would be defined by lines drawn from Flores in the Azores to Berehaven in one direction, and through the Canary Islands to the coast of Africa in the other. This is a much larger area than that which has usually been assigned to manœuvre operations, and as it consists almost entirely of "blue water," it gave

* To be commissioned. † To be completed up.

to the proceedings an oceanic character, and by consequence involved the exclusion of torpedo craft from any share in them. The territory assigned to X was the coast of Portugal, with a primary base in Lagos Bay, and a detached base at Gibraltar where cruisers could coal, but no provision was made for battleships to coal during the operations. England and Ireland were the territory of B, with a detached base at Madeira, apparently assumed to be fortified and fully equipped. Hither the stricken fleet, B 2, had withdrawn, and was refitting after an engagement with X, in which the latter had been victorious. B 2 had apparently lost heavily in cruisers, and had only seven effective cruisers remaining, of which only one, the *Europa*, was a first-class cruiser. X, on the other hand, had twenty-one cruisers, of which seven—the BACCHANTE, KING ALFRED, ABOUKIR, POWERFUL, DIADEM, SPARTIATE, and BLAKE—were first-class modern cruisers of high speed, though all, except the BACCHANTE and ABOUKIR, were newly mobilised ships. These, with eleven battleships of the Mediterranean Fleet, were now preparing for sea at Lagos. On the other hand, in the northern area of the field of operations, B had so effectually disposed of the forces opposed to him, that he was preparing to despatch a powerful force —the B 1 fleet—to the south, for the purpose of combining with what remained of B 2, and of again trying conclusions with the victorious X fleet. B 1 had seven battleships and four cruisers in company at Berehaven; under his command were four armoured cruisers and a light cruiser squadron, consisting of seven second-class cruisers, at Portland. The information common to both sides was that the B 1 fleet at Berehaven, the B cruisers at Portland, the X cruisers at Lagos, and the B 2 cruisers at Madeira, might all leave their respective bases at 8 A.M. on the morning of August 5; that the X battleships would not be ready to leave Lagos until twenty hours later, namely, at 4 A.M. on August 6; and that the B 2 battleships would not be ready to leave Madeira until noon on August 6, but might leave either at that hour or at such later hour as the Admiral commanding the B side might direct.

The conditions here established bear no very direct analogy to the probabilities of real warfare. If the B side be taken to represent a British force, the withdrawal of the B 2 fleet to Madeira would seem to imply that the Mediterranean fleet had been worsted in an encounter with its enemies outside the Straits. But even in that case no British force, having Gibraltar at hand, would be likely to withdraw into the Atlantic, where it would find no bases nearer than Sierra Leone, St. Lucia or Bermuda, nor would any power or probable combination of powers capable of inflicting such a reverse

Its analogies in actual warfare.

on our arms have any base on the Atlantic seaboard south of the Bay of Biscay. Still less is it likely that a victorious British force in northern waters would select Berehaven as its principal base. On the other hand to regard the X fleet as the British force seems out of the question. It represents no probable analogies. But if we reverse the chart and look at it upside down it is not impossible to define the situation in terms of certain possible—though now, happily, very improbable—contingencies of real warfare. Berehaven in this case becomes Gibraltar, and Madeira Berehaven, while Lagos represents Brest. This way of looking at the matter accentuates the oceanic character of the whole scheme of operations in a most significant manner. It implies that though this country has suffered a serious naval reverse in home waters it is nevertheless adequately protected against invasion by means of a victorious "fleet in being" a thousand miles away; and that though the contest for the command of the sea has been in progress for some time with results by no means uniformly favourable to British arms, and indeed specially unfavourable within the circuit of the narrow seas, yet even in these untoward circumstances, the best defensive policy consists in a vigorous offensive resumed at the earliest moment. The lesson is a salutary one, and it was none the less impressive because as the operations were actually conducted they involved the concentration of the two B fleets at a point further removed than their original positions from the shores which would lie open to invasion if they failed to dispose of the X fleet. In other words, in spite of reverses which might seem to require a more immediate local defence, the B admiral deliberately adopted a strategy which was active not passive, offensive not defensive, oceanic not insular. This is the strategy which all history dictates. It is the plainest common sense of warfare to compel the enemy to fight where you choose, not where he chooses, well knowing that if you can beat him there he will do no harm nearer home, whereas if he beats you there he would be much more likely to beat you anywhere else.

Its bearing on the plans and aims of the fleets contending.

Thus the initiative rested with or was seized by the B admiral; and a consideration of distances, probable speeds, and prescribed times of starting will show that within a region roughly defined by the islands of Flores, Fayal and Graciosa, there are several points which, if the speed of B 1 were estimated at 13 knots and that of B 2 at 14, could be reached simultaneously by both before either could be intercepted by X, unless the latter steamed throughout at a speed of 16 knots along the course best calculated to intercept the one or overtake the other. In other words if the rendezvous were fixed within this area, the chances of X intercepting either B 1 or B 2

before they could combine would be reduced to a *minimum*. The utmost speed that could be assigned to X for a transit of over 1000 miles was 16 knots, and even that speed could not be maintained unless the two slowest battleships of the X fleet, the CÆSAR and ILLUSTRIOUS were left astern to follow on as fast as they could. But even that speed would have been of no avail unless X had from the outset chanced to steer a course direct either for a rendezvous of which he could not know the position beforehand, or for some point on the unknown course of one or other of the two converging B fleets which would have brought him athwart one of his adversaries before the point of junction was reached. The probability of X hitting by accident on any one of these three alternatives was quite inconsiderable, nor was there any positive information in his possession sufficient to determine his choice. It was far more probable that in this dearth of positive information he would first seek to obtain direct intelligence of the movements and course of the hostile fleet more accessible to his observation—that is the B 2 fleet at Madeira—and that having done so he would shape his own course and action accordingly. But if this proceeding involved any loss of distance, or any abatement of speed, his chance of preventing the junction was gone, since he could not reach the rendezvous before either of his adversaries, nor could he overtake the one or intercept the other before they got there. It was doubtless on this calculation that Admiral Wilson fixed his rendezvous of concentration within the region above defined, at a point half-way between Flores and Graciosa, situate in latitude 39° 15′ N., longitude 29° 30′ W., 1112 miles from Berehaven, 716 miles from Madeira, and some 1000 miles from Lagos Bay. Here or hereabouts, if all went well, the B 1 and B 2 fleets would come together some time in the evening or early night of August 8, nor could the X fleet by any possibility be in a position to interfere with them unless perchance it had steered a direct course for the same point from Lagos and maintained a speed of 16 knots throughout. If it made a slight deviation to the northward B 1 might possibly be intercepted during the forenoon of August 8, when still some distance from its rendezvous; and a similar deviation to the southward might possibly enable X to overtake B 2 in a corresponding position during the afternoon of August 8. But Admiral Wilson seems to have measured these risks and accepted them, and the result shows that he dared wisely.

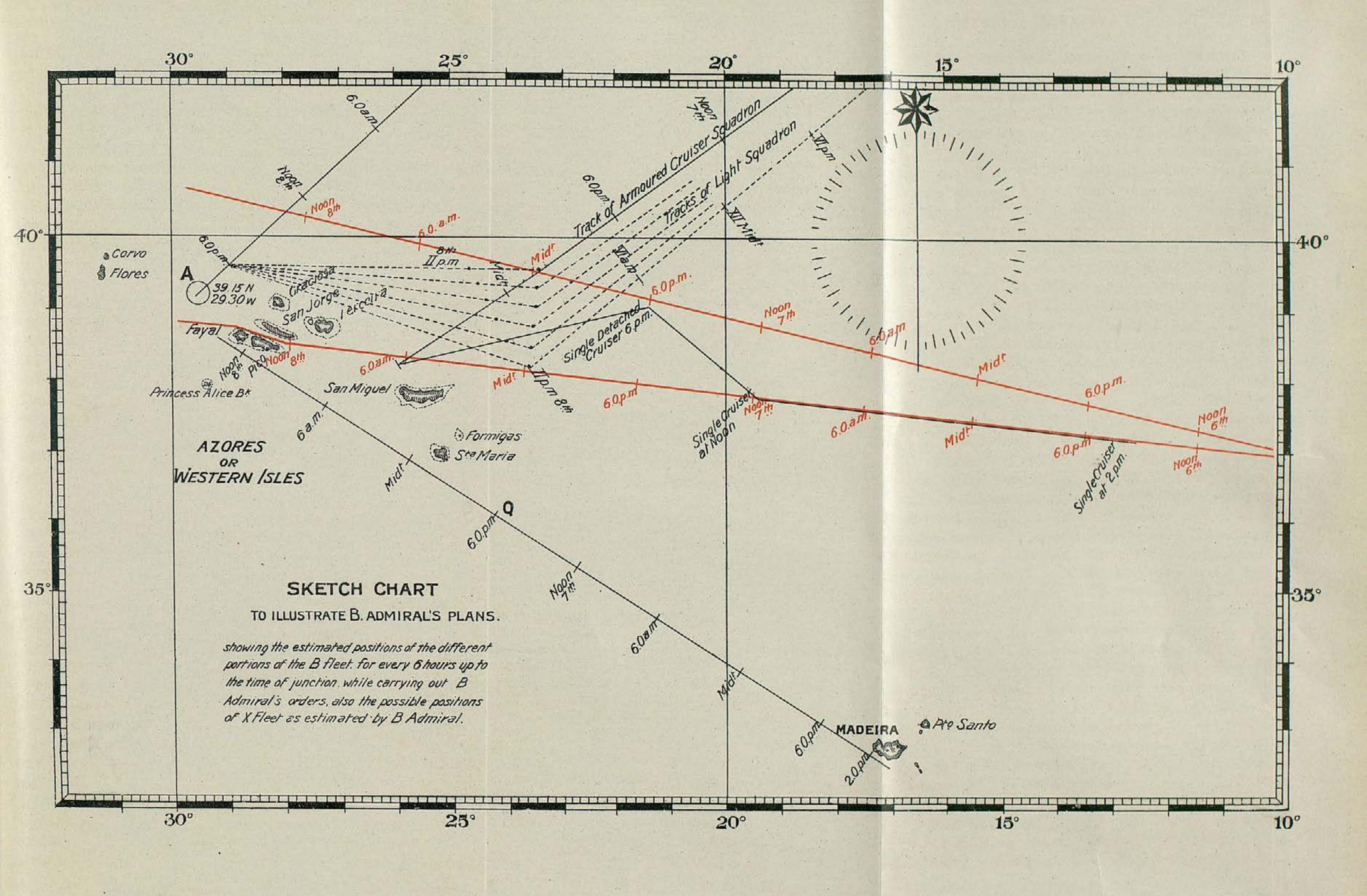
The B plan of campaign. Battle fleets.

We are now in a position to consider the B plan of campaign. B 1 fleet with four cruisers in company was to leave Berehaven at the appointed time—8 a.m. on August 5—and proceed at full speed towards the rendezvous indicated above, its estimated speed being

taken at 13 knots. Twenty-eight hours later, at noon on August 6, the earliest hour allowed, the B 2 fleet was to leave Madeira, and proceeding at full speed—estimated at 14 knots—to steer a course to pass just south of Fayal so as to meet B 1 on its way to the rendezvous. If the prescribed course and estimated speed were maintained by both fleets, B 2 would be just abreast of the passage between Pico and Fayal at noon on August 8; and then rounding Fayal and making direct for the rendezvous, and thence along the course prescribed for B 1, B 2 would come into touch with the latter towards 6 p.m., at a point some 25 miles north-east of the rendezvous. X by making straight for the eastern end of San Jorge and maintaining a speed of 16 knots, might reach that point at noon on the 8th, but would even then be some 45 miles astern of B 2, with the island of Pico intervening, so that unless B 2 failed to maintain its estimated speed it could hardly be overtaken on this course, nor would any course further to the southward have given X any greater advantage. If on the other hand X steered a course some 7 or 8 degrees more to the northward and maintained the same estimated speed of 16 knots, it might intercept B 1 at or near the noon position of the latter on the 8th. If however X could not maintain a speed of 16 knots, the junction of B 1 with B 2 at or near the rendezvous prescribed would of necessity be entirely unmolested. The sketch chart prepared by the umpires "to illustrate B admiral's plans," and here re-produced, will make these several points clear.

General plan for B cruisers.

The four cruisers in company with B 1 at Berehaven were retained with the flag for purposes of scouting and communication. As regards the B cruisers stationed at Portland, the "Preliminary Orders" prescribed as follows: "The B 1 cruisers will sail from Portland under the senior officer to join B 1 fleet *at a sea rendezvous*, as directed by the Commander-in-Chief, Home Fleet." This, of course is perfectly general. The "sea rendezvous" here mentioned might be anywhere within the possible field of operations, including the position actually fixed in latitude 39° 15′ N., longitude 29° 30′ W. But the language of the "General Idea" is more precise, "The Admiral commanding X fleet . . . hears . . . that three squadrons belonging to B have sailed from their home ports, Berehaven and Portland, *obviously with the intention of joining at sea*, and effecting a junction *further south* with the fleet known to be preparing for sea at Madeira." Here the junction of B 1 with the detached cruisers from Portland is apparently represented as likely to precede the junction "further south" with the B 2 fleet. Still more precise are the "Instructions to the Vice-Admiral commanding B fleet:" "Before sailing you will furnish the senior officers of your detached squadron


SKETCH CHART
TO ILLUSTRATE B. ADMIRAL'S PLANS.
showing the estimated positions of the different portions of the B fleet for every 6 hours up to the time of junction, while carrying out B Admiral's orders, also the possible positions of X Fleet as estimated by B Admiral.
AZORES OR WESTERN ISLES
Corvo
Flores
Graciosa
San Jorge
Terceira
Fayal
Pico
Princess Alice Bk
San Miguel
Formigas
Sta Maria
MADEIRA
Pto Santo
Track of Armoured Cruiser Squadron
Tracks of Light Squadron
Single Detached Cruiser 6 p.m.
Single Cruiser at Noon
Single Cruiser at 2 p.m.
A
39.15 N 29.30 W
Q
30°
25°
20°
15°
10°
40°
35°

at Portland with sealed orders as to time and place of *joining you at sea in the approaches to the Channel.*" Thus the junction with the Portland cruisers which in the preliminary orders was to be at a sea rendezvous, was in the General Idea assumed to precede the junction with B 2, and in the instructions to the B admiral—which were officially communicated to the X admiral—it was to take place in the approaches to the Channel. A rendezvous off the Azores can hardly be said to be in the approaches to the Channel, unless the same description applies to a rendezvous anywhere in the Atlantic, and yet this was the only rendezvous given by the B admiral to the Portland detachments of cruisers. He never attempted to join them nearer home, and apparently held himself entitled to interpret his somewhat inconsistent instructions in the most general sense of which they were susceptible. No Government in time of war would expect an admiral to go out of his way to pick up a detachment of cruisers if he thought that he could employ them to greater advantage by sending them direct to some more critical point on some more important enterprise. But the instruction that the cruisers were to join him at sea "in the approaches to the Channel" being communicated to the X admiral might well lead the latter to suppose that the B admiral would have to go out of his way to effect the prescribed junction, a necessity which might make it impossible for B to place his rendezvous of concentration so far to the westward that both B 1 and B 2 could reach it before X could get, at his utmost speed, to the same meridian. It would seem that this consideration did in some measure weigh with the X admiral in making his dispositions. But so far as it did he was perhaps ill-advised in laying any stress whatever on an oversight in drafting which bore no sort of relation to the conditions and probabilities of real war. The last thing that an admiral would know or expect to know in real war would be the instructions issued to or by his adversary. He might think himself lucky if he knew as much as that "three squadrons have sailed obviously with the intention of joining at sea;" and knowing this much he would assuredly assume that no one of these squadrons would go out of its way to effect a junction with either of the others, unless there was some manifest strategic advantage to be gained by so doing. This appears to be the view the umpires took of the matter, so far as it came under their cognizance. There is nothing in their narrative or in their report to show that they thought the B admiral violated the spirit of his instructions in not going out of his way to pick up his cruisers, or in fixing his rendezvous of concentration so far to the westward as he did. They merely report without further comment

and with no protest at all that "B admiral trusting to the speed of his ships chose the westernmost point, which he and B 2 could attain in a given time, and which calculation showed that X could not reach first unless he steamed there direct at 16 knots." Indeed they could hardly be expected to take any other view seeing that they were enjoined to decide each case on its merits, "on the basis of what would be probable in war." Nothing could well be less probable in war than that a commander-in-chief should either be told or tempted to go out of his way to pick up a detached squadron which he thought he could better employ independently for a time. For the rest it seems probable that Admiral Wilson might have satisfied even the letter of his instructions without altering course at all, by so disposing the ships under his command as to establish a long line of wireless communication. But there was no real need for him to do this, and no doubt he was well advised in the circumstances not to risk any loss of time in the attempt to do it. Nevertheless such oversights in drafting as that which is here the subject of comment are not a little to be regretted. They tend to divert the attention of admirals from the real thing and lead them to regard manœuvres as a mere game, which is not war nor anything like war. There always is an unreal element in manœuvres and there always must be, but the thing is to reduce it to a *minimum*.

Armoured Cruiser Squadron of B.

Anyhow, the B cruisers at Portland were given the same rendezvous as the B 2 fleet, but they were not to make for it direct. The armoured cruisers, under the command of Rear-Admiral Fawkes, were to proceed at an average speed of 18 knots on a course which, passing through latitude 39° 30′ N., longitude 23° 15′ W., would bring them to latitude 38° 20′ N., longitude 25° 40′ W., at 6 A.M. on August 8. From this point, if the enemy had not been sighted, they were to pursue the same course until they either came into communication with the B 2 fleet or its cruisers, or got into its track, which would be indicated by casks and other empties thrown overboard by the ships of the B 2 fleet according to orders issued to that effect. Thenceforward their proceedings were to be governed by circumstances, the paramount objects of the whole disposition being: (1) To inform B 2 of the position of X should the latter be found in a position to threaten the former; (2) To break any chain of communication that might be found to exist between X fleet and such of the X cruisers as would certainly be told off to watch B 2 fleet; (3) To keep touch of X fleet, if sighted, until an opportunity occurred of communicating its position to the two portions of the B fleet after they had joined. These objects could not, of course, be pursued concurrently. The first alternative was intended to meet the contingency of B 2 being

so far behind its estimated position that it was likely to be attacked by X before it could reach the rendezvous. In that case it would be important for B 2 to know the exact position of X without delay. But if this was not the case, the second alternative would come into prominence and the third would follow in due course.

Light Cruiser Squadron of B.

The Light Cruiser Squadron at Portland—seven in number—was ordered to proceed at 15 knots, the starboard wing ship steering the same course as the Armoured Cruiser Squadron, for latitude 39° 30′ N., longitude 23° 15′ W., and the port wing ship for latitude 38° 10′ N., longitude 23° 30′ W., the remaining ships dividing the distance between them. On arriving at these positions, or on the line joining them, each ship was to alter course independently and steer for a rendezvous in latitude 39° 40′ N., longitude 28° 55′ W., and there wait for orders. This rendezvous was the position at which B 1 and B 2 fleets would probably meet about 6 P.M. on August 8. The cruisers in question would not, however, have reached the rendezvous at this hour, and the course prescribed for them was intended to enable the B Admiral to obtain information at a later hour by intercepting the northern cruiser of the division, each ship receiving precise instructions as to what she should do in the event of her sighting the enemy, for the combined purpose of keeping touch with the enemy and of conveying her information with all despatch through her consorts to the B Admiral.

Cruisers of B 2.

Of the cruisers attached to the B 2 fleet at Madeira, two only—the *Hermes* and *Prometheus*—were retained with the flag. A third, the *Minerva*, was despatched on a special mission, to be described shortly. The remaining four—the *Europa*, *Doris*, *Rainbow* and *Sappho*—left Madeira at 8 A.M. on August 5 with orders to proceed to the westward, and to wait at the estimated position of B 2 fleet at 6 P.M. on August 7 until the latter should be sighted, or its position should be ascertained by wireless telegraphy, and then proceed to join the Armoured Cruiser Squadron with the information so obtained. By these means it was hoped that in the morning of August 8 Admiral Fawkes, in command of the Armoured Cruiser Squadron, would be made aware of B 2 fleet's position, and would be able to warn the latter if X should have been found in a position to threaten it.

Instructions to

To the *Minerva* was assigned the most critical function of all. Leaving Madeira at 8 A.M. on August 5 she was to take up a position in latitude 37° 15′ N., longitude 12° 50′ W., at 2 P.M. on the following day, so as to be 40 miles ahead of the X fleet, supposing the latter to have left Lagos at the appointed time and to be steaming at 16 knots along a line passing through the position assigned to the *Minerva*. From this position she was to steam at 16 knots along the same line,

so as to maintain a constant distance of 40 miles ahead of the X fleet, supposed to be advancing along the same line. While taking this course she was to endeavour to intercept all wireless signals made by any ship of the X fleet, but to make none of her own, the object being to find out, if possible, so much of the X private code as might enable her at a later hour to call up the X flagship, and to give her false information in the same code as to the movements of the B 2 fleet. This was to be done between midnight and 2 A.M. on the morning of August 7, and to be followed by continued wireless signals, so as to prevent the false information being corrected by any of the X cruisers in the neighbourhood. After daylight on the 7th she was to cease signalling and reduce speed, so as to be in the estimated position on the assumed course of the X fleet at noon. If the X fleet was not then sighted she was to proceed at 18 knots to pass through latitude 39° 5′ N., longitude 21° 20′ W., which would be in sight of X fleet at 6 P.M. on August 6 if it was steaming at 16 knots and steering the best course for intercepting B 1 fleet. Thence she was to shape her course so as to intercept the Armoured Cruiser Squadron at 6 A.M. on August 8, and communicate to its admiral all the information she had been able to obtain. It was well understood by those who despatched her on her mission that in this enterprise the *Minerva* would run great risk of capture, but the advantage to be gained was held to be commensurate with the risk. As a matter of fact she obtained no information whatever, and it may perhaps be added that the mission assigned to her would hardly be very probable in war.

Comment on the foregoing dispositions.

On the assumption that X would hypothetically locate the B rendezvous of concentration at the furthest point to the westward which was compatible with the conditions involved, and would shape his course in accordance with that hypothesis and proceed along it at his highest available speed, these dispositions were masterly. On this assumption Admiral Wilson had provided himself with three several agencies for gathering information of vital moment, all of which would act independently and on separate lines up to a certain point and then converge upon his rendezvous of concentration. Thus, if one or another should fail, he would still have a third string to his bow, and should the assumption prove to be well-founded it was hardly likely that they should all fail. If, on the other hand, the assumption should prove not to be well-founded, it did not much matter if they did fail, because on no other assumption would X be in a position to interfere with the junction of the B 1 and B 2 fleets, since only by steaming approximately in the direction of the supposed rendezvous at a speed of 16 knots could X possibly be there in

time. In other words, the B Admiral provided amply for the only contingency that mattered, and left all other contingencies out of account.

The position of X was much more difficult and the alternatives which confronted him were much more baffling. It was quite impossible for him to determine with any certainty where the B rendezvous of concentration would be, and even if he thought it most probable that it would be where it actually was he could not neglect the contingency that it might be hundreds of miles in a different direction. The only certain thing he could do was to get in touch with the B 2 fleet before it could leave Madeira, and this he did. But he does not seem to have considered that any deviation of his own course to the southward of a line drawn from Cape St. Vincent to San Jorge would almost certainly be fatal to his intercepting either B 1 or B 2 before their junction if their rendezvous of concentration was placed anywhere to the westward of Fayal. His principal or central rendezvous was placed at latitude 36° N., longitude 16° W., 200 miles north of Madeira, and for this he intended to make with his battle fleet at 15 knots on leaving Lagos, expecting to arrive there about 5 or 6 a.m. on August 7. It will be seen from the preceding account of Admiral Wilson's dispositions that the adoption of this course and speed by Admiral Domvile made it impossible for the latter to prevent the junction of his adversaries. In order to have a chance of doing this his position at 6 a.m. on August 7 should have been at least 20 miles further to the westward and very considerably to the northward of his central rendezvous; nor would even this position have availed him anything unless the speed which had brought him there, namely, 16 knots, could have been maintained throughout. But Admiral Domvile could not possibly know this at the time, and even if he had surmised it the surmise might well have appeared to be too precarious to be made the foundation of all his dispositions. His central rendezvous was chosen not for the purpose of covering one contingency only, and that a precarious one, but for the purpose of covering several alternative contingencies with something like equal advantage. From it radiated five alternative series of rendezvous. One along which his own advance was to be made, was placed at equal intervals along the line joining Cape St. Vincent with the central rendezvous and consisted of three rendezvous designated successively L^1, L^2, L^3. At any one of these he could, of course, receive information from his cruisers before reaching the central rendezvous. Another, designated E^1, E^2, E^3, E^4, stretched to the south-eastward along a line which made an angle of 24° with the L line of rendezvous. A third, designated N^1, N^2, N^3, stretched to the north-eastward and

Plans of X.

made the same angle with the L line. A fourth, designated W^1, W^2 W^3, W^4, and W^5, lay in a direction W.N.W. from the central rendezvous, W^2 being indicated as the west concentrating rendezvous and corresponding to an east concentrating rendezvous which lay on the L line some 25 miles to the eastward of L^2. A fifth lay on a line joining the central rendezvous with the eastern point of Madeira and consisted of A and B cruiser rendezvous, the former 50 and the latter about 170 miles south of the central rendezvous, and of a south rendezvous for the whole fleet 120 miles from the same point. B was about 20 miles north of the island of Porto Santo, and a third cruiser rendezvous C was fixed in latitude 32° 55′ N., longitude 17° W., 20 miles north of Madeira. The relative positions of these several rendezvous will be seen at a glance on the chart issued by the umpires "to illustrate X admiral's plans," and here reproduced; and their purpose is best indicated by the following "General Instructions for Rendezvous" which were issued by the X admiral before the operations began:—

General Instructions for Rendezvous.

1. The battle fleet will proceed direct to central rendezvous, leaving Lagos at 4 a.m. on the 6th instant, and steaming at 15 knots along the line of R.V. marked L^1, L^2, L^3.

2. If information is obtained either before or on arrival at C.R.V.—

(*a*.) That the enemy have steered to the westward, the fleet will steam at 14 knots along the line of R.V. marked W^1, W^2, to W^2, and wait there for information:

(*b*.) That the enemy have steered to the eastward, the fleet will steam at 16 knots along the line of R.V. marked E^1, E^2, E^3, E^4;

(*c*.) That the enemy have steered to the northward of E.N.E., the fleet will steam at 16 knots along the line of R.V. marked N^1, N^2, N^3.

3. Should no cruisers be found on the C.R.V. the fleet will wait there till 6 a.m. and then steam to the south R.V. for information.

If the enemy has proceeded—

(*a*.) To the north-westward, the fleet will steam at 16 knots for W^2 (or west concentration R.V.) and wait there;

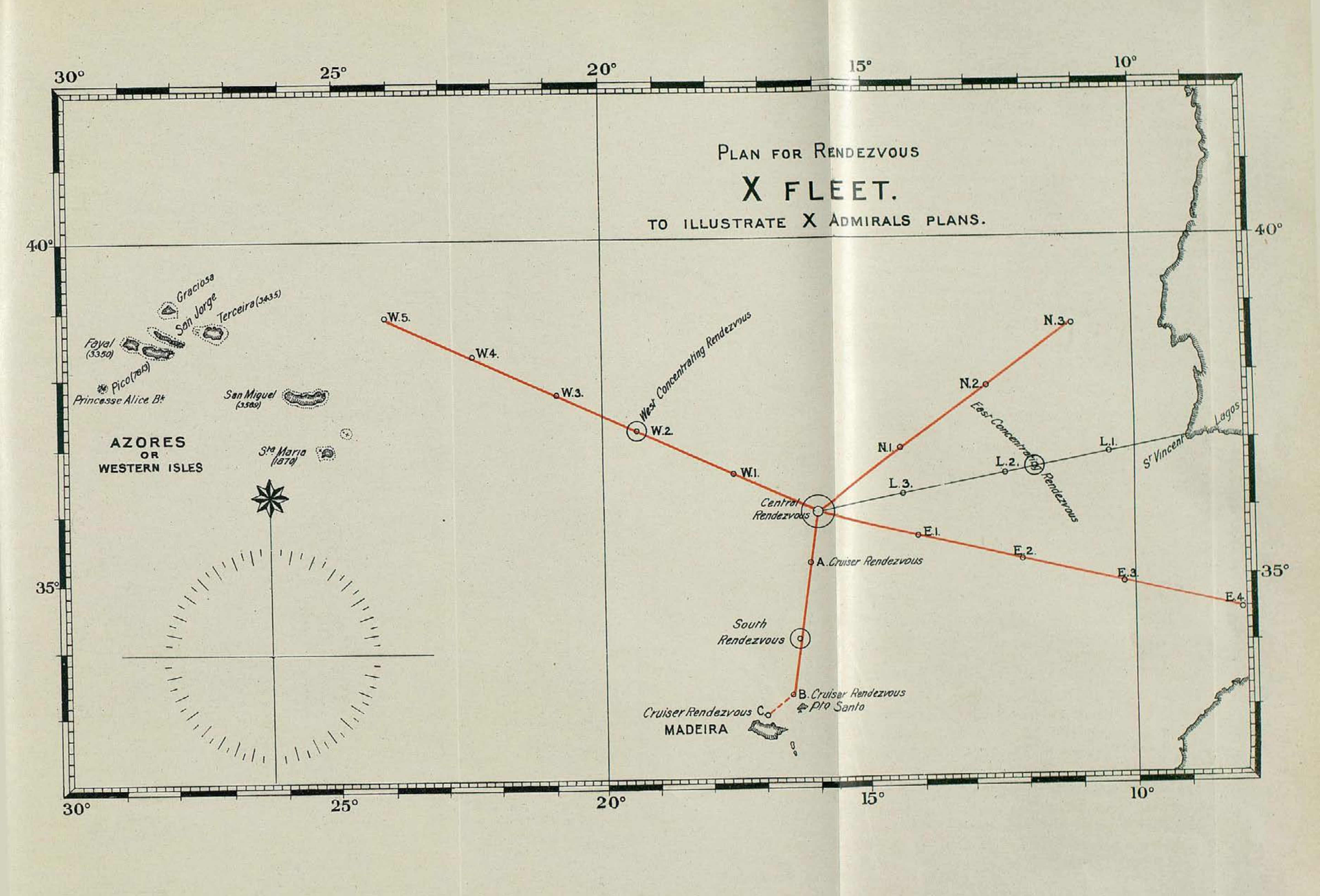
(*b*.) To the south-eastward, the fleet will steam at 16 knots for E^2, and proceed along line E^2, E^3;

(*c*.) Should the enemy remain at Madeira the battle fleet will close towards the island.

4. If on arrival at E^2 or W^2 information is received there that the enemy has doubled back, X fleet will always pass through the central rendezvous on the return journey.

Comment thereupon.

It is not less clear from these instructions than it is from the position of the central rendezvous that Admiral Domvile took no account of the contingency that the B rendezvous of concentration might be placed to the westward of Fayal. He evidently thought it much more likely either that Lord Charles Beresford would be instructed to remain at Madeira until the B 1 fleet came to his rescue, or that, if he left it, it would be to make for a rendezvous somewhere to the eastward of the meridian of the central rendezvous and either to the north or to the south of it. In the alternative of


PLAN FOR RENDEZVOUS
X FLEET.
TO ILLUSTRATE X ADMIRALS PLANS.
30°
25°
20°
15°
10°
40°
35°
AZORES
OR
WESTERN ISLES
Graciosa
San Jorge
Terceira (3435)
Fayal (3350)
Pico (7613)
Princesse Alice Bk
San Miguel (3569)
Sta Maria (1870)
W.5.
W.4.
W.3.
W.2.
W.1.
West Concentrating Rendezvous
Central Rendezvous
N.1.
N.2.
N.3.
L.1.
L.2.
L.3.
East Concentrating Rendezvous
St Vincent
Lagos
E.1.
E.2.
E.3.
E.4.
A. Cruiser Rendezvous
South Rendezvous
B. Cruiser Rendezvous
Pto Santo
Cruiser Rendezvous C.
MADEIRA

B 2 going westward, Admiral Domvile evidently thought that the B rendezvous would be found well to the eastward of the Azores, since even in that case he did not himself intend to proceed to the westward at any higher speed than 14 knots, a speed which could not enable him to interfere with the junction of B 1 and B 2 at any rendezvous west of Fayal. The contingency that even if Lord Charles Beresford did make a feint to the westward in the first instance he would double back at some point and make for some eastern rendezvous was evidently much more present to Admiral Domvile's mind, and for that contingency he had made careful provision. In that case he was prepared to call upon his fleet for a speed of 16 knots, a speed which must have involved his leaving the CÆSAR and ILLUSTRIOUS behind in any case, and, as the sequel showed, could not have been maintained for any length of time by more than four of his battleships. In his report he says: "I had hoped to have been able to maintain a higher speed than 15 knots with the battleships, but with the exception of BULWARK, IMPLACABLE, RENOWN, and possibly RUSSELL, they all reported in answer to my signal that 15 knots was the highest they were prepared to maintain. This speed was very creditable to CÆSAR and ILLUSTRIOUS, whose nominal sea speed is given at 14 knots. I had occasionally to ease for the latter ship, but it was a very good performance." This is a very significant circumstance. That the CÆSAR and ILLUSTRIOUS should be able to go 15 knots and that five newer and faster battleships should be unable to go more is a very suggestive illustration of the difference between sea speeds and paper speeds. It seems to imply that unless a fleet consists of ships recently out of dock, with engines in the highest state of efficiency, and engine room complements at their very best, it will not go within a knot of the paper speed of its fastest ships though it may be able to go a knot faster than the paper speed of its slowest ships. The experience of the B 1 and B 2 fleets was not dissimilar in this respect.

The intended movements and dispositions of the X cruisers are thus described in the umpires' narrative:— Plans for X cruisers.

The X Cruisers, 21 in number, were practically divided into three divisions.

The first consisted of—KING ALFRED (senior officer), POWERFUL, SPARTIATE, and DIADEM, which had orders to proceed at 18·5 knots direct for Madeira, ascertaining in passing that there were none of B 2's ships in Porto Santo.

The second consisted of—BACCHANTE (Flag of Cruiser Admiral), ABOUKIR, VINDICTIVE, GLADIATOR, BLAKE, DIANA, PEGASUS, and PIONEER.

They were ordered to proceed at 16 knots to Rendezvous C, latitude 32° 55′ N., longitude 17° 0′ W. (20 miles north of Madeira), arriving there at about noon on the 6th.

And third, a division consisting of—IMPERIEUSE, HERMIONE, SCYLLA, IPHIGENIA, INTREPID, SPARTAN, NAIAD, PANDORA, and PYRAMUS, which was ordered to proceed at 12 knots to a position in latitude 37° N′., longitude 13° W., then for A Rendezvous, where they were to arrive not later than 10 p.m. on the 6th August, and to remain there until definite orders as to further movements were received.

The general idea in this disposition of the X cruisers was that the four ordered to Madeira at 18·5 knots combined good coal capacity with high speed. These four vessels, with the five larger cruisers detailed to accompany the Cruiser Admiral, were organised in groups of two, and were intended to follow the B 2 Battle Squadron, being detached in couples as occasion required to convey intelligence to X Admiral, the Armoured Cruisers and POWERFUL, if possible, keeping touch with B 2 to the last, in order to witness their junction with B 1; in this way as X Battle Fleet advanced and required more cruisers, the want would be supplied by the vessels arriving with news of B 2.

The cruisers stationed at A Rendezvous were to form a link between the fast vessels carrying intelligence and the Central Rendezvous, and also form a depôt at which cruisers could be found to throw across B 2's track should it be lost by his doubling, and to supply the "runners" which such a move on B 2's part would render necessary.

The two plans considered and compared.

We are now in possession of all the dispositions made by both sides before the operations began. It will be seen that they were made on such different planes of hypothesis and in such different spheres of action that it was practically impossible for the battle fleets on either side to come into contact before the B 1 and B 2 fleets had effected their junction. There is no need to record the fact that this result actually ensued; it was certain from the dispositions made that it must ensue. Whether it could have been prevented by any dispositions which Admiral Domvile could have made and carried out in practice may very well be questioned; but by fixing his C.R.V. where he did, he surrendered all but an infinitesimal chance of preventing it, and by prescribing a speed of only 14 knots along the line of W. rendezvous he threw away even that infinitesimal chance. There is no suggestion of censure, however, or even of criticism in this view of the situation; it is simply a comment on the facts. The plain truth is that Admiral Domvile was completely out-manœuvred by Admiral Wilson in the first stage of the operations. The latter acted on the simple principle that if two friendly fleets are seeking to meet in the open, their best chance of meeting is to fix the rendezvous at a point which reduces the enemy's chance of intercepting either to a *minimum*. Their combination is the paramount object to be attained. No subsidiary object should be allowed for a moment to interfere with its pursuit. So long as they are divided they are liable to be defeated in detail. Once united they can pursue the ulterior objects of the campaign with all the confidence and all the freedom that belong to their combined strength. Admiral Domvile's dispositions were very well adapted to prevent the junction of B 1 and B 2 had they attempted to effect it anywhere to the eastward of the Azores. But Admiral Wilson was far too wary to fall into a trap that was certain to be prepared for him by pursuing a strategy that was full of hazard and justified by no commensurate object or advantage. On the other hand it is no reproach to Admiral Domvile that he did not prevent a junction, which, even had he known

exactly where it was to take place, the failure of his ships in speed would have made it impossible for him to prevent. But as he evidently thought when his orders were framed that his fleet might be expected to steam at 16 knots, it seems strange that it should not have occurred to him that a direct dash at that speed to the northward of the Azores, with his front covered by a widespread screen of scouts, might have put the whole game into his hands. This, however, is perhaps only to be wise after the event.

Proceedings of battle fleets prior to the junction of B 1 with B 2. X fleet.

It will be seen from the foregoing that no particular interest attaches to the proceedings of the battle fleets until after B 1 and B 2 had effected their junction. This they were certain to do unless some accident intervened, and it was equally certain that X could not prevent their doing it. "I saw at once," says Admiral Domvile in his report, "how impossible it was to prevent their joining, at 15 knots, if they had a rendezvous to the northward of the Azores, and the only chance was fogs, bad weather, or accidental causes delaying B 1. I learnt from my cruisers that B 2 steadily maintained 14 knots, with all his ships well up, and I should put down B 1 at 12½, with a possible 13." This practically sums up the proceedings so far as the battle fleets are concerned until the morning of August 9. But a few details may be added. X obtained the information that B 2 had gone west on arriving at the C.R.V., and thenceforward his original programme was carried out; he proceeded at an average speed of some 15 knots along the line of W rendezvous, receiving frequent information from his cruisers as to the course and speed of B 2. No higher speed than 15 knots could be maintained, and even at this speed the EXMOUTH showed signs of distress at 10 a.m. on August 7. On the evening of the same day she had to leave the line and stop her starboard engine, and, though she remedied the defect so as to admit of her steaming at 12 knots, she did not again take her position in the fleet until after the end of the manœuvres, having been ordered back to the C.R.V. on the morning of August 9. At one time Admiral Domvile, acting on the information received from his cruisers, seemed inclined to believe that the junction of B 1 and B 2 would take place on the 26th meridian, and he made preparations for rallying his forces in lat. 39° 20′ N., long. 26° W. But as the ILLUSTRIOUS was beginning to show signs of distress this project was abandoned, speed was reduced, and the original course was maintained until 3.40 a.m. on August 9, when a position in lat. 40° 35′ N., long. 28° 40′ W. having been reached, the course of the fleet was reversed and speed was again reduced. Up to this point no certain information had been received of the position of the B 1 fleet, though there were indications of its neighbourhood,

and the known position of B 2 seemed to show that neither B 1 nor B 2 could be any further to the westward. At 2.15 a.m. the GLADIATOR had reported a battleship steering south in lat. 40° 7′ N., long. 20° 35′ W., and had been ordered to follow it. This must have been the EMPRESS OF INDIA, which was coming up astern of the B 1 fleet, and claimed to have put the GLADIATOR out of action in the course of the night. This claim was not allowed by the umpires, but their narrative relates the incident, with some further details of interest, as follows: "By midnight the *Dido* had succeeded in meeting and giving the B fleet rendezvous to *Royal Sovereign* and *Empress of India*"—they were at the time both astern of the B 1 fleet —"and these were steaming at 13 knots directly towards it. The *Royal Sovereign* in doing so must have run parallel to X's line of advance to the southward, and passed 15 miles off X fleet at about 11.30 p.m. of the 8th, and the *Empress of India* must have run parallel to it to the north and passed X fleet at about 10 miles at 1 a.m. on the 9th, having met a three-funnelled cruiser at 1.50 a.m., which she claimed to have put out of action with a broadside." Both battleships rejoined the B fleet in time to take part in the action which ensued on August 9, but they certainly had a narrow escape. Such incidents are by no means rare in manœuvres, and they will no doubt be just as common in real war. In 1900 two hostile fleets passed each other in the night at a distance of some three miles, and neither observed the slightest trace of the other. The incident is recorded at p. 100 of the *Naval Annual* for 1901.

B 1 fleet. The B 1 Fleet left Berehaven at the appointed time, and proceeded direct for the rendezvous at a speed of 13 knots. Strong head winds prevailed, and towards evening the *Empress of India*, being in difficulties with one of her engines, fell astern, and did not rejoin the fleet until the morning of August 9. On August 7 a gale was experienced which caused the fleet to straggle greatly, only the *Benbow* being able to keep up with the *Revenge*. On the morning of the 8th, when the weather had abated, the *Royal Oak*, *Benbow*, and *Sans Pareil* were in company with the flag, the *Hood* was hull down astern, and the *Royal Sovereign* was out of sight. "At 9 a.m. speed was reduced to 13 knots to enable the two latter ships to gain ground. At noon the advanced ships of B 1 were 25 miles behind their expected position owing to the bad weather of the preceding day, and the *Hood*, instead of closing the flagship during the day, was lost sight of at 5 p.m." Nevertheless the three battleships astern having received the rendezvous from a cruiser, rejoined the flag in safety, the *Hood* at 9 p.m. on August 8, the *Royal Sovereign* at 2 a.m., and the *Empress of India* at 6.35 a.m.

on August 9. The junction with the B 2 fleet was effected shortly after 7 p.m. on the 8th. At first sight it might seem to have been a rash proceeding on Admiral Wilson's part to leave three of his battleships out of seven astern, especially at a time when he was nearing the region in which, according to his calculations, the X fleet was most likely to be found. But there are situations in which the boldest course is also the safest, and this would appear to have been one of them. Admiral Wilson was 25 miles astern of his calculated position at noon on August 8. He had instructed Lord Charles Beresford to wait at that point for orders should the latter reach it before meeting the B 1 fleet. Lord Charles Beresford would have reached it about midnight between August 8 and 9; but before reaching it he must have passed across the line of Admiral Domvile's advance at a time when the latter was very close to the point of intersection. Hence, if Admiral Wilson had tarried on his way for the purpose of keeping his fleet together, it is quite possible that Lord Charles Beresford might have been overpowered before the B 1 fleet appeared. Moreover, Admiral Wilson had to reckon that Admiral Domvile would have eleven ships. As a matter of fact he had only ten at the time, but this Admiral Wilson could not know. Lord Charles Beresford had only eight ships in all, and, as one had been left behind at Madeira, he brought only seven to the rendezvous. Hence, by pushing on with four ships, Admiral Wilson could make certain that if only the junction could be effected, he could meet his adversary on at least equal terms so far as numbers were concerned. It was a nice calculation in any case, for the hazards were many and evenly balanced. But apart from its justification by the event, it may well be held to have been wisely determined, as well as boldly.

The B 2 fleet left Madeira also at the appointed hour. The *Ramillies* was left behind in consequence of severe sickness on board. Her remaining behind was, of course, noted by the X cruisers and forthwith reported to Admiral Domvile, who, being ignorant of the cause of her detention, naturally interpreted it as a ruse. The fleet was very skilfully shadowed throughout by X cruisers, the last of which, the BACCHANTE, only withdrew after observing the impending junction between B 1 and B 2, being then short of coal. Had the junction been delayed she must, for this reason, have withdrawn without observing it. She was not allowed to withdraw unmolested, the *Good Hope* and *Hogue* being ordered by Admiral Wilson to chase her. But when the order was given to chase she was mistaken for the SPARTIATE, and she was in consequence engaged by the *Good Hope* before the *Hogue* came up. At the close of the engagement B 2 fleet.

both ships were ordered out of action by Admiral Sir Baldwin Walker, the senior officer in the BACCHANTE.

X cruisers. The intended disposition of the X cruisers has already been described in detail; but it was much dislocated by breakdowns in the event. The cruisers all left Lagos together at the appointed time, the BACCHANTE group for rendezvous C, the four heavy cruisers, KING ALFRED, POWERFUL, SPARTIATE and DIADEM for Madeira direct, and the IMPERIEUSE group for rendezvous A, to stay there until the time came for transmitting intelligence to the X Admiral, and thenceforward to form a depôt of "runners" either at A or at the central rendezvous, in case it should be found that B 2 had doubled back to the eastward. As B 2 made straight and steadily to the westward this group of cruisers took no further part in the operations. It is not quite easy to understand why so little employment was provided for them in any but one contingency which never became actual. Their speed was deficient, it is true, but if this rendered them useless they might just as well have been left at Lagos, and it would, perhaps, in any case have been better to demonstrate their inutility than to assume it. If ships like the HERMIONE, the SCYLLA class, and the PANDORA class are of no value for scouting, it is just as well that the Admiralty and the country should know it; but such knowledge is to be obtained only by showing that they cannot do what is required of them, not by giving them nothing to do. Shortly after the start the KING ALFRED was in trouble with her engines, and her place was taken by the ABOUKIR. The KING ALFRED rejoined the X fleet, and after repairs she was able to steam 18 knots, doing much good work at that speed. In the same forenoon the POWERFUL broke down in both engines, and, dropping astern, took no further part in the manœuvres. On the morning of August 6 the three remaining ships of the advanced squadron, the ABOUKIR, SPARTIATE and DIADEM, were off Porto Santo, and found no enemy there. The ABOUKIR then proceeded westward along the north side of Madeira, and ordered her two consorts to round the eastern point and go westward along the south side. Coming in sight of the anchorage of Funchal in the course of the forenoon, they observed the B 2 fleet with two cruisers still at anchor there, and the SPARTIATE thereupon ordered the DIADEM to proceed to rendezvous C and inform Sir Baldwin Walker, the Cruiser Admiral in the BACCHANTE, of the result of their observation. "The object of this is not apparent," as the umpires remark with much pertinence, "for the Cruiser Admiral knew they"—the B 2 fleet, that is—"could not leave before noon, but

wanted the earliest information of their course and speed after leaving. This the SPARTIATE was unable to send him, as when B 2 left he had to follow to keep touch and had no cruiser left to send back to the BACCHANTE."

Proceedings of X cruisers continued.

The Cruiser Admiral sighted the DIADEM, and received her intelligence shortly after noon while making for the C rendezvous. He forthwith despatched DIADEM, BLAKE and DIANA at full speed to get in touch with B 2, and followed himself with the remainder of his cruisers except PEGASUS, which was sent to C rendezvous and ordered to remain there for twelve hours. Before 2 P.M. the BLAKE had broken down from a serious and disastrous accident to one of her boilers, which disabled her from taking any further part in the manœuvres. When Funchal was reached and found deserted by the enemy with the exception of the *Ramillies*, which remained there, the BLAKE was sent in disabled, and the PIONEER was detached to watch the *Ramillies*. The ABOUKIR proceeding westward along the north side of Madeira sighted the B 2 fleet making to the westward as she rounded the western end of the island, the SPARTIATE being in full pursuit astern. Making a wide sweep across the front of the enemy she rejoined the SPARTIATE astern, when she forthwith despatched the latter with orders to proceed to C rendezvous and inform the Cruiser Admiral of B 2 having actually left. This was just as inconsiderate a proceeding as the previous proceeding of the SPARTIATE already recorded, and the comment of the umpires is just as pertinent: "Why the SPARTIATE was thus sent to C rendezvous is not clear, as there could be no doubt that the Cruiser Admiral would not have remained there; as a matter of fact, he had, on receiving the DIADEM'S information, gone round the east end and come west along the south shore, and if SPARTIATE had gone back south of the island she must have met him. As it was she failed to find him at C rendezvous, and in default of further orders she proceeded north and joined the X battle fleet, so that her services were lost to the Cruiser Admiral at a time when they were urgently required." It is evident that we have still much to learn concerning the art and mystery of scouting, and that the captain of a scouting cruiser must be a man of sound judgment and cool head, never losing a moment and yet never acting heedlessly.

The same continued.

Thus before he had even sighted the enemy Sir Baldwin Walker had lost the services of four of his best cruisers—the KING ALFRED, the POWERFUL, and the BLAKE through breakdowns, and the SPARTIATE through mismanagement. The PEGASUS had also been sent to C rendezvous, and the PIONEER had been left at Madeira. The ABOUKIR was in full pursuit of B 2, and astern of her steaming at full speed

on the same course was the BACCHANTE, flagship, with DIADEM, DIANA, GLADIATOR and VINDICTIVE. These were all that were left to keep touch with B 2 and maintain communications with the X Admiral. The VINDICTIVE was next detached at 4 P.M. on August 6 to inform the X Admiral of what had happened up to that hour. She rejoined him at the central rendezvous or thereabouts on the morning of August 7 and was thenceforth attached to his flag. By the morning of the 7th all the remaining X cruisers had overtaken the B 2 fleet, and the DIADEM was then detached to give further information to the X Admiral. She found X the same evening, and was thenceforth retained with the flag, as, owing to the loss of boiler water, she could not go more than 15 knots. There were now only BACCHANTE, ABOUKIR, GLADIATOR and DIANA left. The two latter were detached towards dusk on the evening of August 7, when the B 2 fleet with the shadowing X cruisers were approaching the island of Santa Maria. They found the X fleet the next morning, communicated their intelligence, and remained with the flag. There was some rain and mist during the night of the 7th, but the BACCHANTE and ABOUKIR never lost touch, and on the morning of the 8th a few shots were exchanged with two of the B 2 battle ships, the *Majestic* and the *Mars*, which had dropped somewhat astern of the line. An attempt was also made to cut off the *Hermes*, but it failed, although the ABOUKIR chased the *Hermes* through the channel between Pico and San Jorge, whither the latter had been sent to reconnoitre. On abandoning the chase the ABOUKIR rounded the western end of San Jorge and made to the northward to convey further intelligence to the X Admiral. The BACCHANTE thus remained alone. She continued to follow the B 2 fleet until its junction with B 1 was imminent and then made off to the eastward. Her course was practically run. She had followed steadily and doggedly as far as she could, and indeed as far as she needed, but she could have followed no further as her coal was running short. Her final exploit was to put the *Good Hope* out of action as already related.

Comments thereon.

All things considered, this shadowing of the B 2 fleet by the Cruiser Admiral, while maintaining frequent and adequate communication with the X fleet, was a very noteworthy performance. It was conducted in spite of serious and unexpected breakdowns and was not a little embarrassed at critical moments by the rather heedless proceedings, first of the SPARTIATE and afterwards of the ABOUKIR. Sir Baldwin Walker cleverly managed to conceal the identity of his flagship to the last, for his flag was never hoisted during the pursuit, nor were any of his signals intercepted by the B 2 fleet; and when at last he had to retire she was mistaken by her adversaries

for the SPARTIATE and pursued and engaged by the *Good Hope*, under that misapprehension. All this is full of suggestion and instruction, but it will not escape notice that the limit of her effective radius of action had been reached when she had conducted the scouting operations for a fleet which had not itself proceeded more than 1000 miles from its base. This is a very significant fact indeed. It brings once more into very instructive prominence that little considered topic of "coal strategy," the vital importance of which has more than once been dwelt upon in the pages of the *Naval Annual*.

Proceedings of the B cruisers.

The proceedings of the B cruisers were of less critical moment, for, as all their dispositions were based on the assumption that X would hasten to the westward at a speed of 16 knots, and that his course would lie within a very acute angle which had Cape St. Vincent for its apex, and as X did nothing of the kind, it follows as a matter of course that they were very unlikely to come into critical contact with any of the X forces. The *Minerva* carried out her instructions to the letter and fell in with the Armoured Cruiser Squadron at the appointed rendezvous; but she had been far ahead of the X battle fleet throughout, and when she joined Admiral Wilson's flag she had nothing of moment to report. The *Europa* with her consorts waited for the advent of B 2 fleet where they had been ordered to wait, and having sighted the latter and exchanged signals with Lord Charles Beresford they proceeded in execution of previous orders and came in touch with the Armoured Cruiser Squadron in somewhat untoward circumstances to be hereafter related. The Armoured Cruiser Squadron and the Light Cruiser Squadron left Portland at the appointed time and proceeded on their prescribed course. To the latter nothing of importance occurred from August 5 to August 8, the several ships being in touch with each other by means of wireless telegraphy throughout. In the afternoon of August 8 they all reached the positions at which they were to turn up for the B rendezvous, but at this point the *Æolus*, having reported that she was short of coal, was ordered back to Lagos. Towards evening the *Medusa* sighted an X cruiser, and ordering the *Medea* and *Melampus* to close and form line she endeavoured to chase. But as the *Medea* and *Melampus* could not keep up the chase was abandoned. The hostile cruiser was the DIANA, which mistook her pursuers for one first class and two second class cruisers—as a matter of fact they were all third class—and being several miles ahead she prudently declined to engage. As she was at this time astern of the X fleet the *Medea* very narrowly missed the opportunity of conveying information concerning the whereabouts of the latter to Admiral Wilson during the night of August 8–9. In the course of the night

the *Latona* came into communication with the *Hogue*, and received a new rendezvous with the B Admiral, and this was subsequently communicated to *Medusa, Medea, Apollo* and *Melampus*, all of which with the *Latona* rejoined the B flag in the early morning of August 9. But the *Andromache* having received no further instructions after arriving at the line of position on Saturday, August 8, proceeded to the original rendezvous, and after waiting there until noon on August 9, returned to Lagos.

The Armoured Cruiser Squadron.

The Armoured Cruiser Squadron left Portland on August 5 in accordance with the orders already quoted and proceeded on the course prescribed at a speed of 18 knots. Shortly after leaving the *Sutlej* was troubled with priming and afterwards with hot bearings, and dropped astern in consequence. The next day she had developed such serious defects that she had to put into Arosa Bay, and took no further part in the manœuvres. Nothing of moment occurred until after 2 a.m. on August 8 when a wireless message was received from *Minerva*, which was calling up both *Good Hope* and *Europa*, and informed the former that she had not seen the X fleet. The squadron was at this time spread for look-out duties, the *Hogue* being in the centre, the *Good Hope* five miles to port, and the *Drake* five miles to starboard. At 2.45 a.m. four vessels were sighted on *Good Hope's* port bow. These proved to be the four cruisers of the B 2 fleet under the orders of the *Europa*, which had struck the prescribed line of advance of Admiral Fawkes' squadron and were proceeding along it with a view to meeting them. On sighting them, but before ascertaining their force and class, Admiral Fawkes formed ahead of the *Hogue* in the *Good Hope*, and signalled to the *Drake* to close. His own narrative is as follows: "On approaching the strangers were made out to be one four-funnelled cruiser and three second class. They were of the same class and number as the B 2 advanced cruisers, but I did not expect to see them so soon and especially not close together. To make sure I made *Europa's* pendants in code four times and could get no answer. As she could also see me signalling in code to *Drake* to close, I concluded they were enemies, part of X's linking cruisers which it was most important to disperse. As I had no time to lose to reach the rendezvous at the appointed time, and it seemed probable they would endeavour to lead me into a chase, I engaged them at once, and ordered *Drake* to chase and capture the rear ships. About this time the four-funnelled cruiser was observed to make a signal by our code to *Doris*, on which I hauled off and made the demand. Signal came—*en clair*—'*Europa*,' and afterwards '*Europa*' in our code. This did not clear up the mystery, as it was the signal we had made to her. I therefore made a signal

in our code '*Europa*, any news?' to which I received no reply. Although on receiving the reply '*Europa*' it seemed possible they might be friends, I found it very difficult to decide what they were, and recalling *Drake* proceeded to the rendezvous where I found *Minerva*." When the *Good Hope* and the *Europa* met again in daylight later in the day and of course recognized each other at once, the *Europa* gave her account of the engagement to the senior officer as follows: "Engaged three four-funnelled cruisers at 3 a.m. this morning, the enemy appeared to have got hold of our secret code. They made *Drake's* number and signalled her to close. They fired on me at close range. I signalled to ships to disperse and have not seen *Doris* or *Sappho* since. We were in latitude 38° 36′ N., longitude 24° 34′ W. expecting to meet you. I claim one of the ships torpedoed and the other disabled from the mainmast shot away." To this Admiral Fawkes replied, "I engaged you last night with *Drake* and *Hogue* as you did not answer your code list number, although made four times." The *Europa* thereupon replied, "I very much regret to hear what you say. I made my number by secret code. I had actually secured guns. I am much disappointed, as I had made such a good shot at finding you." Admiral Fawkes' regret is expressed in his own narrative as follows: "I submit that it was very unfortunate the *Europa* did not give me (1) an answer to my coded signal, or any signal in code; (2) an answer to my coded signal 'any news,' as in the latter case I should have been spared the long journey to B 2's track." The key to the whole misunderstanding is no doubt to be found in the following passage from the umpires' narrative, "These cruisers had up to this"—the time when they proceeded to meet the Armoured Cruiser Squadron—"been communicating at night with each other by means of a foghorn, in order to avoid using lights; this was satisfactory if the ships were well closed up, but after some discussion by signal it was now decided to use a small hand lamp placed low down, for signalling at night." It seems probable that the code signals made by *Europa* to *Good Hope* were made in this way and were not observed by the latter either because the lamp was too feeble or because its light, being screened so as to show only in one direction, was so directed as not to be visible from the *Good Hope*. It should be noted that the *Europa* was a mobilized ship specially commissioned for the manœuvres, and it may be that she was not supplied with the best apparatus for signalling of this character. The whole case was investigated by order of the B admiral when the fleets returned to Lagos, but the result of the inquiry is not given in the report of the umpires as submitted to Parliament.

Comments on the foregoing proceedings.

The incident might well give rise to very serious misgiving if there were any reasonable probability of a like thing happening in real war. But such a probability seems to be extremely remote. It is true that the torpedo craft of different nations are often very much alike in trim and appearance, and for this reason it is quite possible, and even probable, that a friendly destroyer or torpedo boat might be taken for an enemy and *vice versâ* in time of war. This, however, is so well understood that all torpedo craft must expect to be fired on at sight in time of war, and will only have themselves to thank if on approaching a friend they do not make their purpose and identity known in a quite unmistakable manner. But the case of larger vessels is quite different. Here the differences in trim and appearance between the warships of one nation and those of another are as a rule so marked that there would be little or no chance of either taking the other for a friend at any distance less than that at which it would be prudent to open fire. The circumstances which led to the misunderstanding were such as must prevail in peace manœuvres, but are never likely to prevail in real war. There would be no fiddling with signals in real war, and no waiting to see whether the ship challenged could answer in the proper code or not. The *Drake* was visible from the *Good Hope* at a distance of five miles, and so, therefore, must the *Europa* have been when she was first observed. Long before she came within fighting range she would have been recognised as an enemy, and so treated without the slightest misgiving. Indeed, it was the very fact that both sides were using the same codes—both open and secret—that brought about the misunderstanding. The *Europa* answered the challenge in code, and naturally supposed that her answer had been received by the *Good Hope*, although as a matter of fact it had not. She then observed that the *Drake* was ordered to close in the same code, and naturally supposing that her identity had been recognised she seems to have closed herself for the purpose of communicating, securing her guns as she did so. In point of fact she fell into a trap that had not been prepared for her, and one which, though it might have been prepared for her in manœuvres, could not well have been prepared for her in real war. She fancied that the other side had got hold of the secret code of her own side. Of course it is quite possible that a belligerent in real war might get hold of the secret code of the enemy, but it is not easy to believe that his attempt to use it, as to the manner born, would escape instant detection. The art of signalling is not learnt in a day, its particular methods differ in different navies, and a foreign signalman attempting to make signals in a strange language and an unfamiliar code would be pretty certain

to make such a hash of it that the answer would be a broadside. The truth is that the *Good Hope* mistook the *Europa*, and the *Europa*, when fired on, mistook the *Good Hope* simply because they both belonged to the same Navy. Had they belonged to different and hostile navies there would have been no such misunderstanding, nor yet had they been friends and at war with a real enemy.

Comments continued.

At the same time it may perhaps be held that the facts and indications presented to Admiral Fawkes might have been better co-ordinated and appreciated by him. He was acquainted with the orders given to the *Minerva* and to the *Europa* group of cruisers. If all went well he might expect to come into contact with both at or about the position in which he was. He had been in communication with the *Minerva*, and knew that she had attempted to call up the *Europa*. There is no mention of other wireless signals being made, such as would indicate the presence of an enemy within effective range of communication, and though their absence was a purely negative indication it might have been taken for what it was worth. When the *Europa* and her consorts were fully made out they proved to be and were recognised to be "of the same class and number as B 2 advanced cruisers." But this indication was no doubt properly distrusted when the *Europa* failed to answer the *Good Hope's* signals effectively. This will account for and justify the *Good Hope's* opening fire, though it must, it would seem, have been perceived that when the *Drake* was ordered to close the *Europa* did the same apparently in obedience to the same signal. So far the failure of the signals would account for all that happened, but when communications were opened again the frank reply of *Europa* making her pendants both *en clair* and in code should surely have warned Admiral Fawkes that he was perhaps making a mistake. Nor is his final comment entirely impervious to criticism. He submits that "it was very unfortunate that *Europa* did not give me an answer to my coded signal or any answer in code." He knew from herself that she had answered, and answered in code. His comment should surely have taken the form of a regret that her answer had not been observed. However, we may console ourselves with the reflection that such an imbroglio of mistaken signals and mistaken identity is one of the last things that is likely to happen in real war.

Further proceedings of B cruisers.

After the action and the meeting with *Minerva* the Armoured Cruiser Squadron steered on divergent courses for separate positions on B 2's track, hoping to get touch with B 2 by wireless telegraphy. But B 2 was so intent on breaking up BACCHANTE'S messages and BACCHANTE on breaking up B 2's messages that this method of

communication was blocked, and Admiral Fawkes steering for the nearest point of B 2's position obtained the information he required from the homely indication of the biscuit boxes and other empties thrown over by Lord Charles Beresford's ships for the purpose. Judging from this that B 2 was ahead of him Admiral Fawkes altered course and steered for Graciosa. At this juncture the *Drake* dropped astern, being compelled to stop her starboard engine for a hot bearing, and was left behind. By a lucky chance she was able to put in an appearance in one of the final stages of the general action which took place on August 9. Off Terceira the *Europa* and *Rainbow* were picked up, and the mystery of the action of the previous night was explained by means of the signals exchanged with the *Europa*. Towards evening the junction with the B battlefleets was effected. The *Doris* and *Sappho* parted company with the *Europa* during the action with the Armoured Cruiser Squadron, having been ordered to disperse. They both made for the B rendezvous, the *Doris* sighting the B 2 squadron about 5 p.m. on August 8, and the *Sappho* rejoining the combined squadrons some few hours later.

The meeting of the B fleets.

The meeting of the fleets is described by those who saw it as one of the most impressive spectacles ever witnessed in manœuvres. The following account was given by the correspondent of the *Times* from on board the *Majestic*. After describing how the B 2 fleet had struck the line of Admiral Wilson's advance about 4 p.m. on August 8 at a point which the latter should also have reached unless he had been delayed, and how at that point no sign of the B 1 fleet was to be discerned, the correspondent continues: "So far I had written this afternoon when a message from the deck informed me that things were about to happen. On reaching the deck I saw very little to indicate an impending change in the situation; but a few minutes' observation and inquiry disclosed a transformation scene of the most marvellous character. The first thing I heard was that the Marconi apparatus had given proof that the *Doris* (?), one of the *Europa's* squadron of cruisers, was in touch with the *Edgar*, one of the B 1 cruisers, and shortly afterwards with the *Revenge*, Admiral Wilson's flagship. This made it quite clear that the B 1 fleet had not yet been intercepted by X, though many of the indications we had previously obtained had seemed to point in an opposite direction. Very little was as yet to be seen from the bridge. The *Hermes* was far away ahead, little more than her smoke being visible, and the *Doris* (?) was not yet in sight. But on the starboard bow the smoke of several vessels gradually came into view, while shortly afterwards a very faint smear of smoke on the horizon indicated the approach

of other ships on the port bow. The latter were probably the B 1 fleet, which we now knew through the *Doris* (?) to be still unassailed—or at least undefeated. If so, it was a little astern of its appointed position; but that was now immaterial so long as it had not encountered X. But what was the smoke on the starboard bow? Was it the X fleet, or was it a squadron of X cruisers, or was it the cruisers of Admiral Fawkes. A few minutes showed it to be three four-funnelled cruisers, and a few minutes more showed them to be friendly cruisers steaming at high speed towards the line of Admiral Wilson's advance. Ultimately they proved to be the *Good Hope*, the flagship of Admiral Fawkes, accompanied, unless I am mistaken, by one other of his squadron and by the *Europa*. Simultaneously with the recognition of these cruisers as friends the whole horizon seemed to be suddenly alive with warships closing in from nearly every point of the horizon before the beam. I have never seen anything like it in all my experience of manœuvres. We who had come from Madeira had traversed some 750 miles, Admiral Wilson and his fleet had traversed over 1000 miles, and Admiral Fawkes and his squadron had traversed over 1100 miles. Here we were all meeting at an improvised Clapham Junction of the ocean, not indeed with exact punctuality, but with a deviation from it so slight as to be quite immaterial and highly creditable in the circumstances."

Admiral Wilson's advantage.

Thus the first stage of the manœuvres had ended in a decisive advantage for Admiral Wilson. He had combined his divided forces and lost none of them by conflict with the enemy. But he had gained no information concerning the latter's position and intentions, nor did any of his incoming cruisers bring him any intelligence of moment. The *Minerva* alone had sighted some of the X cruisers far away to the eastward at an early stage of the proceedings, but she exchanged no shots with them. On the other hand, of the X cruisers which had shadowed the B 2 fleet all the way from Madeira only the BACCHANTE held on to the last. But her coal was getting short, and as soon as she saw that the B concentration was imminent she made away to the eastward. She was pursued by the *Good Hope* and *Hogue* under the impression, conveyed by signal from the B Commander-in-Chief, that she was the SPARTIATE, an unarmoured instead of an armoured cruiser. Under that impression the *Good Hope* outsteamed the *Hogue*, attained a speed of 22 knots, reduced a lead of nine miles to 3000 yards, and engaged the chase single-handed, with the result that both ships were put out of action. "Had I had any suspicion it was one of the Cressy class," says Admiral Fawkes, "I should have headed her off by getting on her bow threatening a torpedo attack and let *Hogue* come up, and should have

done so even with a SPARTIATE had I not realised that it would take a long time, and *Hogue* was getting short of coal." But a little more of the *Hogue's* coal would have been well burnt in disposing of the BACCHANTE without sacrificing the *Good Hope*.

Proceedings of B after the junction.

Having combined and reorganised his forces Admiral Wilson lost no time in prosecuting his search for the X fleet which he was now eager to engage. Course was set for the direction of Lagos, and a rendezvous given for the following morning where the battleships of the B 1 fleet which were still astern, and the outlying cruisers might be expected to join the fleet. On the following morning Admiral Wilson had all his ships together, except such as had been disabled, and was, as he says, "able to collect all the information available before deciding on further plans for searching for X fleet. The information was mainly of a negative kind, X fleet was not in the area which had been passed over by the armoured cruisers, or that which had been searched in one direction by the cruisers of the light squadron, and by those of B 1 and B 2 fleets in the other, and therefore he was probably to the northward of it; but as I thought it was likely that he would go to the eastward as soon as he knew that our fleets had joined, and it was advisable to keep between him and his port, I thought it best to make the first sweep to the eastward." Dispositions were made for this purpose, but early in the forenoon hostile cruisers were observed and chased in a north-westerly direction, the fleet altering course to support the chasing B cruisers. "Soon after noon," says the narrative of the umpires, "the leading B 1 cruisers had got beyond ordinary signal distance, but by heliograph the *Hawke* was just able to send back information that *Europa* was chasing the X cruiser DIANA." Admiral Wilson's own account is somewhat more explicit than this, though it is not quite consistent with it, since he seems to imply that *Europa* had abandoned the chase of DIANA and was chasing another X cruiser when she first sighted the X fleet. The point is not very material, however, since it is certain that the *Europa* pressed her chase far enough to penetrate the enemy's screen of cruisers and to sight the main body of his fleet. It is not less certain, on the other hand, that the DIANA had already done the same by the B fleet. "The vessel," says Admiral Wilson, "which proved to be the DIANA, after approaching near enough to count our ships, made off to the northward." Here, at any rate, the honours of the game were equal and divided between *Europa* and DIANA. But Admiral Domvile had not many cruisers in company at the time. The final stage of the cruiser operations is thus related by Admiral Wilson:—"B 1 cruisers were then recalled from chasing DIANA and ordered to chase W.N.W. the direction in which *Europa*

was chasing, in order to keep touch with her. The *Hawke*, being the fastest of these cruisers, succeeded in getting near enough to the *Europa* to see what she was chasing, and kept me informed by heliograph of what she was doing until her bridge dipped below the horizon and only *Europa's* masts were showing, and about 12.15 p.m. the *Europa* passed out of sight. At 12.45 p.m. *Europa* sighted the enemy's battle fleet, and the signal reached me by flags through the chain of cruisers at 1.15 p.m., and we sighted them very soon afterwards."

The foregoing mention of the heliograph as an effective agency for distant signalling at sea invites special attention. Its use on land for similar purposes is no novelty. But the difficulty of directing its beam from the unsteady platform of a ship at sea so accurately as to insure its correct observation by the signalmen of a ship at a distance of several miles has hitherto restricted its use afloat. This difficulty appears to have been overcome by means of apparatus which is understood to have been devised by Admiral Wilson himself, and this apparatus was first brought into practical and effective use during the manœuvres of 1903. No mention was made of it at the time by any of the correspondents afloat, because shortly before the operations began Admiral Wilson had instructed the commanding officers under his orders to "request newspaper correspondents not to publish any information as to methods used for signalling in the fleet." But since it is mentioned in the official narrative, both by the umpires and by Admiral Wilson himself, there appears to be no further need for reticence. When the B 1 and B 2 fleets met, the first signals received by the *Majestic* from the *Revenge* were transmitted by heliograph. The two ships were a long way apart, but the signal came in a series of brilliant flashes like the sparkle of a diamond in the sun. The advantages of the method are indisputable. It is as rapid as the transmission of light, and is available so long as the sun is shining and the bridges of the two ships communicating are visible to each other above the horizon; thus if the height of each bridge above the waterline be 40 feet, the distance at which the heliograph signal can be instantly seen and clearly read will be over 14½ nautical miles. Moreover, the method has the further advantage of rendering the signal visible only to the ship to which it is addressed. Two ships might be freely communicating with each other, and yet no other ship could possibly intercept the signals passing, unless it were either in the same line of vision or within a very narrow deviation from it. The nature of the apparatus employed has not been made public, but its ready and rapid use by the ships under Admiral Wilson's immediate command would seem to show that it is at once simple and effective.

Use of the heliograph at sea.

Preliminaries of action and narratives of the two Commanders-in-Chief.

When the position of the X fleet was first reported to Admiral Wilson it bore in a north-westerly direction and was steering for its central rendezvous. The B fleet was steering in the opposite direction, so that the two fleets were rapidly closing on opposite courses, and came in sight of each other very soon after they had both become aware of their relative positions. Before describing in detail the engagement which ensued, it may perhaps be as well to cite the very brief accounts of it given by the two Commanders-in-Chief, respectively. Admiral Domvile says, "I returned back along my line of advance and met the combined B fleet at 1 p.m. on Sunday the 9th inst. Not wishing to engage them before I had picked up EXMOUTH and my cruisers, I kept away with the intention of steaming round them; but by their alteration of course they gave me such an advantage whilst working round them that I took it, only firing at their leading ships which were Channel fleet; their rear ships were never in action. I claim, therefore, at least, their four leading ships and *Hogue*, and as my three rear ships were taken rather closer to the main division of the enemy than was intended, I gave those three ships as the most likely to have been put out of action; but it is difficult to tell until all the results are plotted." It is clear from this that Admiral Domvile's first impulse was to avoid an action and wait until he had picked up the EXMOUTH. But Admiral Wilson had hoped all along to get between him and his base, and had done so. He had his full force of battleships with him, while his adversary was one short for a time, and though he was inferior both in speed and in quality of ships, yet he had the superiority in numbers in the proportion of 14 ships to 10. Probably he held that if Admiral Domvile once allowed himself to be drawn into an action—even a rearguard action, as it might be called—he must either abandon his rear ships, as indeed he did, or make the action a general one by coming back to their rescue. Anyhow, in the conditions as they stood, the choice and the initiative rested with him. He knew that if he let this opportunity slip it would never return, that Admiral Domvile would not give him another opportunity until he had picked up the EXMOUTH, and that then, having the superiority of speed, he would choose his own time and method of attack. Hence the "obvious advantage" which Admiral Domvile took may have been given of set purpose, and not either of necessity or through faulty tactics—indeed, the latter alternative is inadmissible where such a master of tactics as Admiral Wilson is concerned. Be this as it may, it is clear that Admiral Domvile was not anxious for a fight, and that Admiral Wilson was. It was what he was there for, and he could never fight on more favourable terms. He might

not win—and according to the umpires he did not—but if he could not win there and then, he never could win at all. His account is as follows:—

While closing the enemy, I asked the battleships by signal what speed they could count on, and received the following replies:—

Revenge	13 knots.	*Majestic*	14 knots.
Royal Sovereign	13½ ,,	*Prince George*	15 ,,
Sans Pareil	13 ,,	*Jupiter*	15 ,,
Benbow	13 ,,	*Repulse*	14 ,,
Empress of India	13 ,,	*Magnificent*	14 ,,
Royal Oak	13 ,,	*Hannibal*	14 ,,
Hood	14 ,,	*Mars*	11 ,,

The low speed of the *Mars*, owing to her oil having been all expended, prevented me from engaging at a higher speed than 11 knots, though, I think, during the engagement she did rather better than she promised.

This low speed prevented me from obtaining the full advantage of my numbers, as it was impossible to bring the rear ships into action except at very long range, and, of course, the enemy might have avoided action altogether if he had wished to do so.

It is impossible to give an opinion as to the result of the battle until the plans have been worked out; but it formed an interesting example of a fast fleet endeavouring to inflict damage on a slower fleet of superior force that was anxious to bring it to action, by trying to attack one wing in passing.

As soon as the fleets were steadied on nearly parallel courses, so that further manœuvring was unlikely, I signalled to all ships to proceed at full speed, when *Mars*, *Royal Sovereign*, *Sans Pareil*, and others dropped back, and *Benbow* came up. It would have been unsafe to do this at an earlier stage, as the ships dropping back would have caused confusion when alterations of course were made.

Towards the close of the engagement the ILLUSTRIOUS and CÆSAR, the two rear ships of the enemy's line, sheered off to starboard, and I sent the second sub-division with *Hogue* in chase. I think, however, it will be found that these two ships were practically knocked out before they sheered off.

The B 1 cruisers were afterwards ordered to chase in the same direction, in order to keep up communication, and this brought on an engagement between the KING ALFRED and the *Hogue*, *Edgar*, and *Hawke*.

At 4.50 P.M. I signalled "Propose reference to Umpires," and to this the Commander-in-Chief replied that he had no objection. I was also informed that the Commander-in-Chief considered our four leading ships were put out of action, and the RENOWN, ILLUSTRIOUS, and CÆSAR from the X side.

The fleets close and manœuvre for position.

As the two fleets closed, X was in single line ahead with four cruisers in company, one being the KING ALFRED, and B with 14 cruisers, many of them still much scattered by the chase, was in divisions line ahead, the second division, consisting of the B 2 fleet, being to port. They sighted each other at a distance of some 14 miles, and X thereupon altered course (at 1.10 p.m.), eight points to starboard together going off to the S.S.W., and increasing speed as soon as possible to 15 knots. This speed was attained at 2 o'clock, when course was altered by a slight inclination to port, and the new course was maintained until 2.45 p.m. As X was on the starboard bow of B when its course and formation were first altered, B altered course together two points to port for a short time, and then resumed the former course. But shortly before two the order to alter course together to S.W. was given and followed almost immediately by an order to form single line ahead, the second division

taking station ahead of the first with the *Majestic*, the flagship of Lord Charles Beresford, leading the line, and the *Revenge*, the flagship of Admiral Wilson, Commander-in-Chief, in the centre. In this formation the action was fought throughout by the B fleet. The foregoing movement brought the two fleets on slightly convergent courses, the distance between them at 2 p.m. being about eight miles, and Admiral Domvile's flagship, the nearest ship of the X line, being abreast of the fourth or fifth ship of the B line. In these relative positions it is manifest that as X had now quickened to 15 knots, while B could barely maintain 12, B ran a risk of being distanced before he could bring X to action. Accordingly, Admiral Wilson "commenced at once to close X to fighting distance by turning his ships together two points at a time towards X, going back into line to see what ground he had lost until 2.36, when, finding that the X fleet had drawn so far upon his bow that his line of fire would be too oblique, he ordered the fleet to form line of bearing north on the *Revenge*, taking guide of the fleet himself, and keeping on the same course. This movement was not carried out without difficulty by the rear ships, which, already pressed to keep station, found it hard to gain so much ground on the *Revenge*, and it practically was not completed before the next change took place at 2.50 when the fleet was ordered to form line of bearing N.N.W. on the *Majestic*, which ship again became guide of the fleet. It in a measure, however, restored to most of the ships of B the arc of fire which they would otherwise have lost."

Further manœuvres for position.

About this time the X fleet again altered course towards the southward, so as to make the two fleets converge more rapidly than before, and by 3 p.m. the distance between them had been reduced to five miles, but B was now bearing E.N.E. from X, that is, was beginning to be left behind. It was at this point that Admiral Domvile must have perceived his "obvious advantage," for at 3.9 he altered the course of his ships towards B two points, and a few minutes later formed his first and second divisions separately into single line ahead, the second division being to starboard. At 3.18 he signalled to his first division to "open fire as soon as possible." Meanwhile the B fleet was again altering course and line of bearing, so as to assume a course to S.S.W. and a line of bearing N.W. on *Majestic*. The rear ships straggled a good deal in their efforts to keep station and the line of bearing which would have given B the advantage he was seeking could it have been accurately assumed was not of much help to him, "as the rear ships could hardly get up into position whilst the leading ones pressed on to get into range, thus making the formation more an irregular quarter line

than the line of bearing ordered." The intention was unimpeachable, but it was in some measure frustrated by lack of speed.

A diversion by the KING ALFRED.

At this juncture a slight diversion occurred, just before the general action began, in an attempt by some of the X cruisers, headed by the KING ALFRED, to cut off such of the B cruisers as were stationed on the port bow of the *Majestic*. The B cruisers were promptly withdrawn to a position of safety under the lee of the B line, but not before the KING ALFRED had exposed herself to a heavy fire from the leading ships of B. She in her turn was not less promptly withdrawn by Admiral Domvile just about the moment when the action became general. In the greater interest of this action the proceedings of the KING ALFRED attracted little attention, and no claim appears to have been made against her, but in the opinion of some who were present she must then and there have been put out of action.

Fire opened by X, and single line ahead formed.

Admiral Domvile's signal to "open fire as soon as possible" was made at 3.18 and must have been obeyed very shortly afterwards. At this time the X second division which had been formed in line ahead eight cables to starboard was in obedience to the order "form single line ahead" gradually edging towards the first division in a "forming and disposing" movement. As time was being lost, Admiral Domvile made in succession "form astern of first division" and "turn eight points to port," the result being that though the Rear-Admiral probably did not turn fully eight points, yet when he turned to starboard to form in rear of the first division "he found himself inside the line of that division and heading two points more to starboard than they." The effect was to throw the rear of his line nearer to the leading ships of B so that at 3.30, when the action was in full swing, his rear ship, the ILLUSTRIOUS, was only 4340 yards from the *Majestic*, while the BULWARK was 6210 yards. At 3.20 the X Admiral had made a signal to his first division, "Concentrate fire on two leading battleships," and at 3.30 to his second division, "Concentrate fire on four leading battleships." On the other hand B had also opened fire and the orders of the *Majestic* to her division were that its fire should be directed on numbers 4, 7, and 10 of the X fleet, that is, on the LONDON, RUSSELL, and ILLUSTRIOUS as presumably offering the best targets at the moment. By 3.30, however, all the seven ships of the first division of B were firing at the ILLUSTRIOUS, the last ship of the X line. Why it is not easy to see except that she was, of course, the nearest and therefore the easiest mark. Adequate control of fire is almost impossible when none of its effects can be observed, and it was equally impossible for Lord Charles Beresford to perceive that in spite of his orders all the

ships of his division were firing at the ILLUSTRIOUS alone. In real action, on the other hand, the fire of individual ships, even if imperfectly controlled from the flagship, might be expected to adjust itself automatically to the visible results of the engagement so that the accident of seven ships all firing at one, and that one in all probability already disabled, is almost the last thing likely to occur. The umpires themselves seem to reason on the foregoing premisses in the following passage of their narrative: "The action between 3.30 and 4.30, at a time when the ranges were moderate, had been severe, but as no evidence of it could be visible, it was not possible for the Admirals to know for instance, that for some time every ship of the B fleet, which was in range, had fired at the ILLUSTRIOUS, whilst her next ahead the CÆSAR had escaped with slight damage, nor could they know that the VENERABLE, which was never hit, had fired at no other ship than the *Majestic* with the result, that, other fire apart, she had put her out of action singlehanded." But this reasoning seems to be abandoned when the umpires come to assess the final results of the action. It was rightly abandoned, no doubt, if the only object was to ascertain from the fire returns of each individual ship what particular ship in the enemy's line she had fired at and how many times she had fired. But as a means of determining "what would be probable in war," such a method seems to be not a little wanting in common-sense.

Comments on the earlier phases of the action.

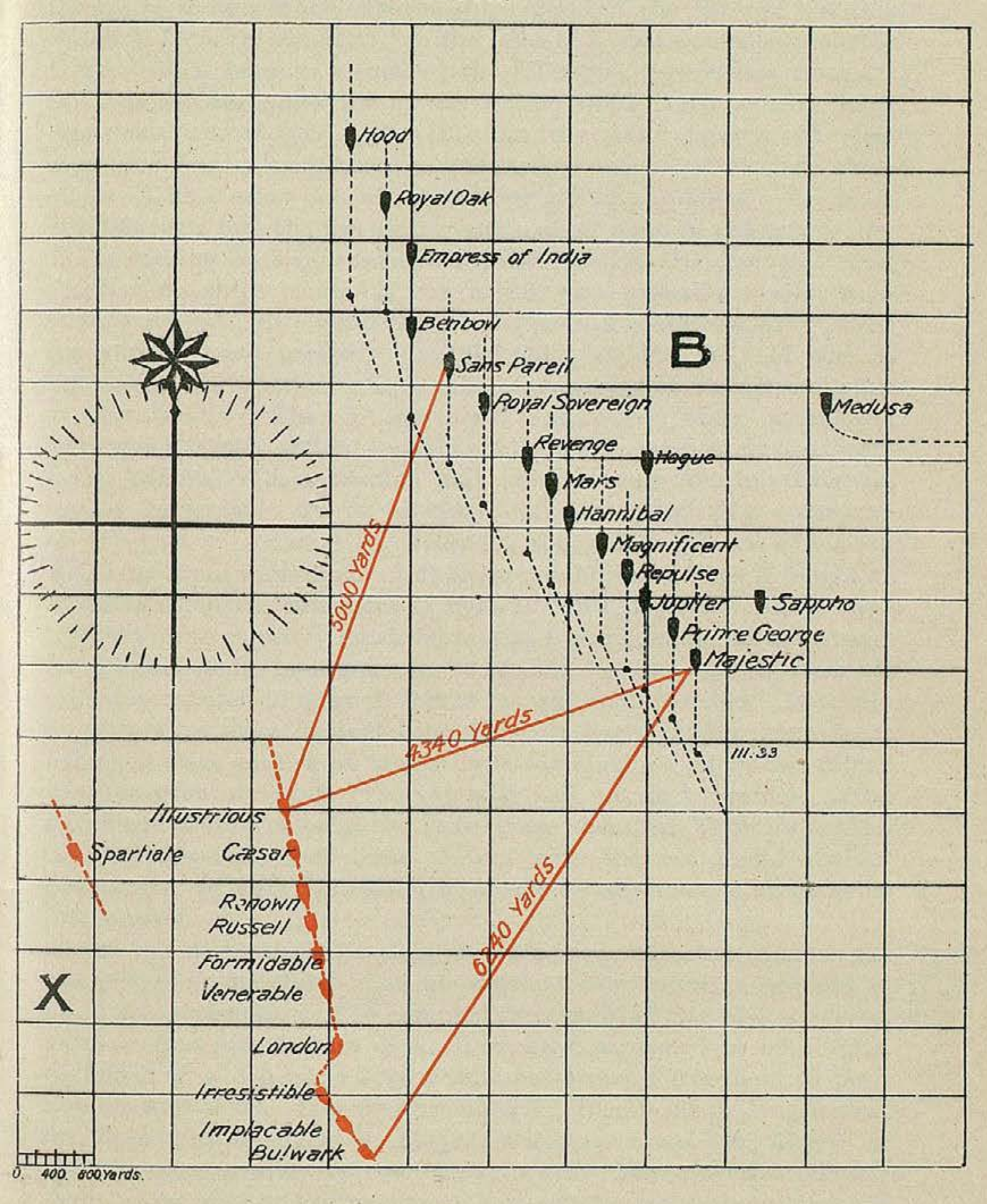
It is probable that in real action the whole course of the engagement, if not its final issue, would have been determined by the results of the first few minutes' fire. The umpires give a diagram, here reproduced, of the situation as it stood at 3.30, barely ten minutes after fire was first opened. It can hardly be thought to bear out the statement of Admiral Domvile that the B rear ships "were never in action." The BULWARK at the head of the X line was at this time 6240 yards from the *Majestic* at the head of the B line. The ILLUSTRIOUS at the rear of the X line was at the same time 4340 yards from the *Majestic*, only 5000 yards from the *Sans Pareil*, the tenth ship in the B line, and rather less than 6240 yards—the distance of the BULWARK from the *Majestic*—from the *Empress of India*, the twelfth ship in the B line. It follows that if the BULWARK was ever in action every ship in the B line from the *Majestic* to the *Empress of India* must have been in action on terms no more unfavourable than the BULWARK; and if no ship in the X fleet fired at any but the ships of the Channel fleet—as Admiral Domvile says—there were at least four ships at the rear of the X line—RUSSELL, RENOWN, CÆSAR and ILLUSTRIOUS—that were exposed to the unreturned fire of *Revenge*, *Royal Sovereign*, and *Sans Pareil* at no

Fleet Action, *August 9th.*

Position at III. 30.

X Fleet. Course changing from S^{b}E. to S.E^{b}S.

B Fleet. Course SOUTH.



3.18. *Bulwark* signalled to 1st Division (Leading Division): "Open fire as soon as possible."

3.18. *Bulwark* opened fire at 7000 yards.

3.23 to 3.27 } The remainder of X Fleet opened fire.

3.24. *Majestic* signalled to 2nd Division (Leading Division): "Open fire."

greater distance than that of BULWARK from *Majestic* as well as to the fire at shorter range of seven ships ahead of the *Revenge*. If this situation be fairly considered in the light of "what would be probable in war," it is hard to withstand the following conclusions from it; (1) that the leading ships of the B line would very quickly have been disabled, if not sunk; (2) that the same fate would simultaneously have overtaken a corresponding number of the rear ships of the X line, every one of which, even if only disabled must have dropped back into the fire of the unimpaired ships at the rear of the B line coming fresh into action; (3) that though the discomfiture of the leading ships of the B line might, and probably would, have thrown its rear into confusion, yet even this could not have saved the retarded and partially disabled ships at the rear of the X line from destruction unless the comparatively uninjured ships at the head of the X line had returned to their assistance, thus making the action a fight to a finish, which was exactly what Admiral Wilson wanted and exactly what Admiral Domvile sought to avoid. It is, in truth, only a speculative enterprise at the best to attempt to evaluate the results of an action in which no shots were fired. But the action off the Azores if fought as Admiral Domvile intended to fight it must, it would seem, have inflicted quite as heavy losses on him as it inflicted on his adversary, and its initial effects might have compelled him to fight it after all not as he wanted to fight it, but as his adversary wanted. It is idle to conjecture even in that case what its result might have been, but as a mere matter of tactics it is certainly no slight advantage to make your adversary do as you wish and not as he wishes. That advantage would apparently have been Admiral Wilson's unless Admiral Domvile had been content with the not very "obvious advantage" of only destroying as many of his enemy's ships as he lost himself.

Further reflections on the action.

If the foregoing reasoning is even approximately sound the conclusion is inevitable that no stage of the action subsequent to its first few minutes can be regarded as possessing any real actuality. In those first few minutes things must have happened in both fleets, the effect of which must have determined every subsequent disposition on both sides. It makes no material difference how long it took for these critical things to happen, whether it was ten, fifteen, or twenty minutes after fire was first opened. The essential point is that as soon as they had happened any subsequent disposition made by either side on the hypothesis that they had not happened was altogether bereft of any intelligible relation to "what would be probable in war." It is altogether outside every imaginable proba-

bility of war that two fleets should be engaged for a quarter of an hour, several ships on both sides being within 5,000 yards of each other, without palpable results, such as must determine every subsequent stage of the action, and every disposition which either Admiral would make. Indeed the only way to give real meaning to the action would be to suppose that an omniscient umpire was present with authority to order at his discretion say, *Majestic*, *Prince George*, *Jupiter*, and *Repulse* in the B fleet to haul out of line and cease fire, and RUSSELL, RENOWN, CÆSAR, and ILLUSTRIOUS in the X fleet to reduce speed by 2 knots and cease fire from 50 per cent. of their guns in action. The effect of such an order might have produced some approximation to the probabilities of war; but in its default each successive phase of the action subsequent to the first can only be regarded as an independent tactical exercise bearing no relation to what had preceded it, and just as little to what followed it. For this reason it seems scarcely needful to analyse the later stages of action in any detail, because they can have little meaning when considered separately, and less than none if they are regarded as continuous and successive.

B closes and X draws ahead.

At 3.37 the B Admiral, having brought the bulk of his fleet well within range of X and within comparatively short range of the rear of X, began to increase speed, giving the order for full speed at 3.40 and turning two points to port at 3.55, as the X Admiral was gradually edging towards the same course, and had previously made the signal T.A., which required the rear ships in his line to follow his motions without waiting for a specific signal to do so. All this time the rear division of X was directing its fire almost exclusively at the leading division of B, though some shots were fired at the *Revenge*, "whereas the whole of B's leading division, with *Revenge* and *Royal Sovereign* added, were almost altogether firing at the ILLUSTRIOUS; so that by four o'clock, when she left the line, it may be assumed that her gun fire would have been silenced. That this should not have been known to either B or X is inevitable in manœuvres." It seems necessary to add that such a thing would be quite impossible in real war.

Critical position of X second division.

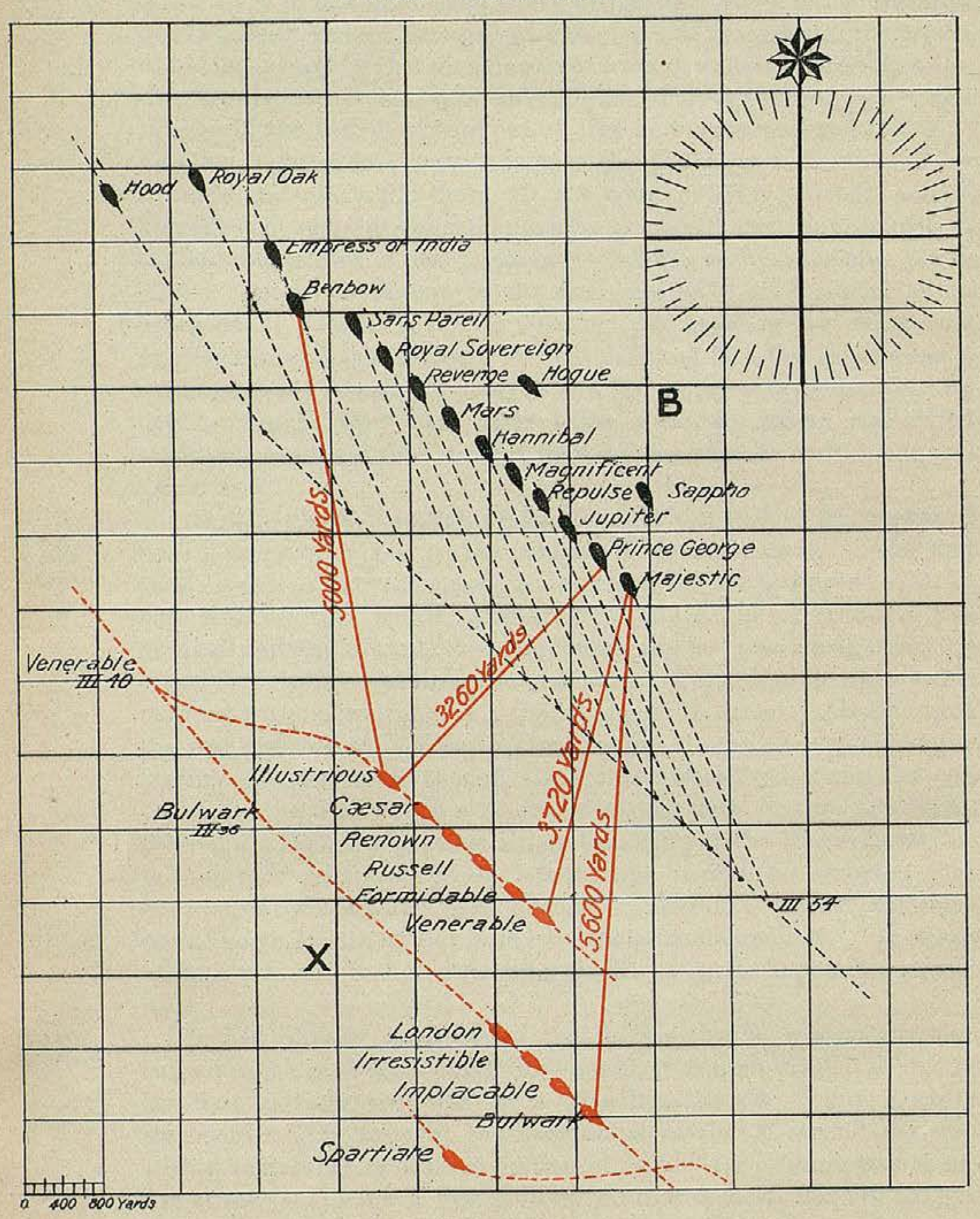
It has already been stated that when the X second division turned up so as to form single line ahead, it turned inside the line of the first division, and was for a time heading two points more to starboard. This brought the rear ships of the X second division within easy range of a large portion of B, and for a time masked the fire of the rear of the X first division, so that at 3.45 the VENERABLE was 3,720 yards from the *Majestic* and the ILLUSTRIOUS only about 3260 yards, while the latter ship was only 5000 yards from the

Fleet Action, *August 9th.*

Position at III. 45.

X Fleet. Course S.E.

B Fleet. Course S.S.E.



Benbow, the eleventh ship in the B line, and not more than 6800 yards from the *Hood*, the last ship in the B line; at the same time the BULWARK, at the head of the X line, was 5600 yards from the Majestic and the other ships of the X first division somewhat nearer, but the fire of at least two of them was masked by the X second division. Admiral Domvile had promptly perceived the critical position in which his second division was being placed, and at 3.33 had made the general signal, "Form single line ahead," followed by a semaphore signal to VENERABLE, "Lead your division straight across [do not follow the bend] but do not mask the fire of my cruiser." This cruiser must have been the SPARTIATE, which was about 1400 yards on the starboard beam of the X first division, but masked from the whole of the B fleet in range by the X second division. The words in brackets were apparently not taken in by the VENERABLE, and in their absence Admiral Custance appears to have taken the signal to mean that he was to lead across towards the enemy, with the result that by 3.45 he had got his division into the position already described. At this time at any rate, if not before, the fate of the X second division would seem to have been sealed, and the probability is that the leading division of B would have been in no better plight. But there was this difference—the uninjured rear division of B was coming on apace, while the leading division of X was already from 7000 to 8000 yards away from the *Revenge*.

CÆSAR and ILLUSTRIOUS leave the X line.

At 3.47 Admiral Domvile ordered his first division to cease fire, the fire of its rear ships, as was recorded by the IRRESISTIBLE, the third ship in the line, being masked, and at 3.50 he ordered the VENERABLE to "join the line again." About the same time the VENERABLE made the signal, "Rear ships of second division edge away to starboard, refuse the rear," and began to edge back into line herself. Admiral Custance apparently thought that his rear ships had had enough of it, and made the time-honoured signal for withdrawing them from close action. But the signal was received by the CÆSAR, the senior of the two ships addressed, in the form, "*confuse* the rear"; and in a signal subsequently made to her consort, the ILLUSTRIOUS, the captain of the CÆSAR interpreted it to mean, "that we are to engage the ships on our starboard quarter and draw them from the main body." Accordingly about 3 51 the CÆSAR sheered out of line to starboard, and was followed by the ILLUSTRIOUS. The ILLUSTRIOUS was certainly out of action by this time—the umpires state in their award that her gun-fire was silenced, the ship entirely disabled, and that she would probably have been sunk—and accord-

ing to all the probabilities of war the CÆSAR must have been in little better plight. It makes very little difference therefore what interpretation the CÆSAR put on the signal which was intended to save her and her consort. They were probably both past saving at the time.

They are recalled, but misunderstand the signal.

Observing their erratic proceedings, Admiral Domvile inquired of VENERABLE what CÆSAR and ILLUSTRIOUS were doing, and as Admiral Custance could not explain they were recalled and ordered to take station. But it was too late. They attempted to recover the ground they had lost, but Admiral Wilson had already detached his rear subdivision, consisting of *Empress of India, Royal Oak,* and *Hood,* under Rear-Admiral Poë, in chase, and observing this Admiral Domvile sent the KING ALFRED to support them, and at 4.10 ordered them to "steer S.S.W.," thinking that on this course their speed would enable them to weather their pursuers. But the captain of the CÆSAR, still apparently thinking that he was required to engage the enemy's rear, did not attempt to escape, and brought about a separate action, to which reference will be made hereafter. The whole episode is instructive in the abstract as showing how easily signals may be misunderstood and what momentous consequences may follow from misunderstanding them; but in the concrete it has no reality at all because the ILLUSTRIOUS was certainly, and the CÆSAR probably, out of action before ever the signal was made to them. If the whole of the X second division was not also out of action it is at least probable that the VENERABLE was hardly in a position to make a signal at all.

B orders a general chase.

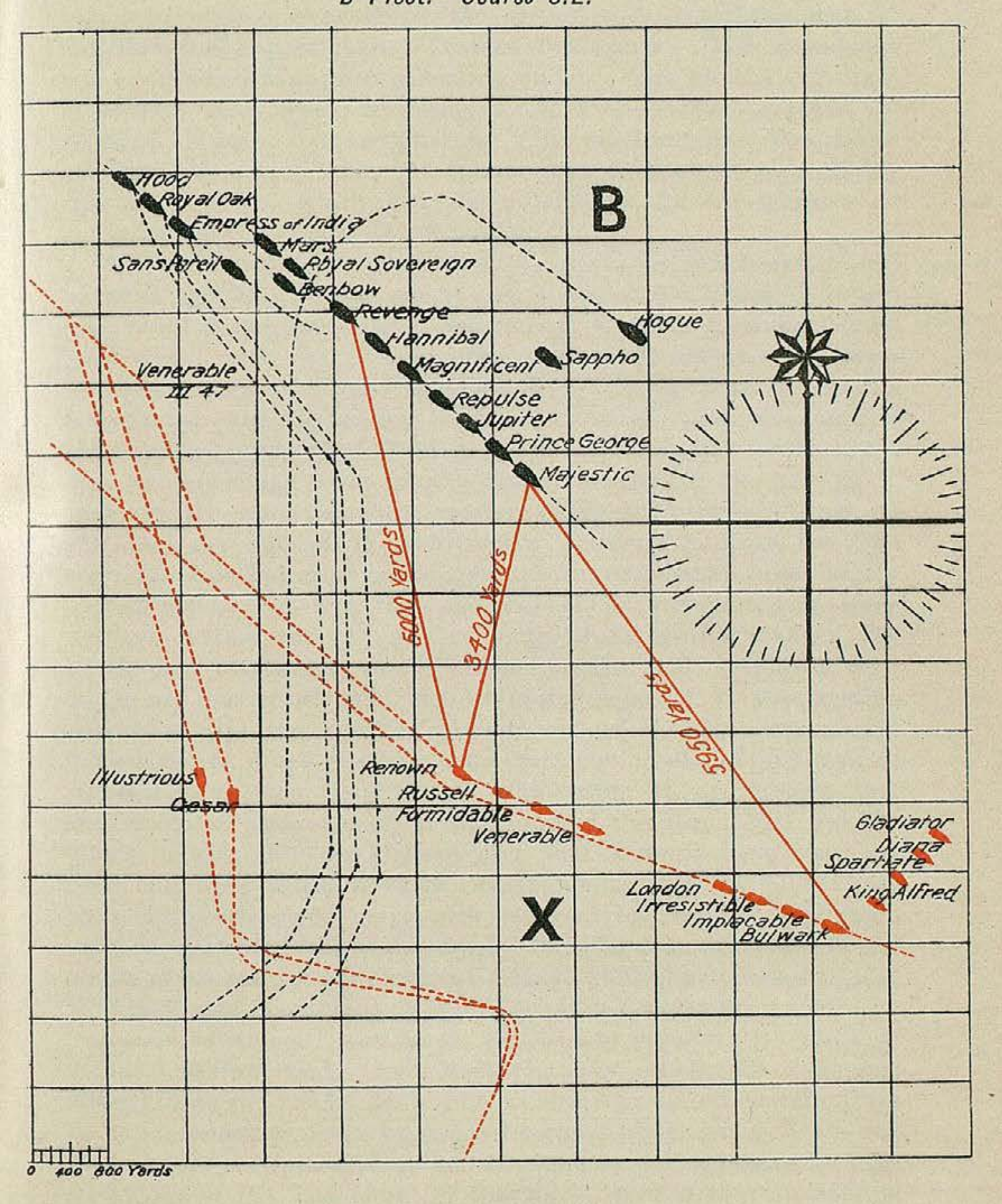
"The B fleet at 4 o'clock had gained their best position, and had their fire been more distributed they would have inflicted more loss upon X." It seems obvious to remark, though at this point the umpires do not, that in real action their fire would certainly have been more distributed, because it would have been directed in accordance with the visible indications of its effect. Ships do not go on firing at a ship that is defeated any more than a sportsman goes on firing at a bird he has already killed. Anyhow, to quote again from the umpire's narrative, at 4.9 Admiral Wilson "made his last alteration of course to E.S.E., and practically followed X fleet at his utmost speed." The remaining stages of the action are so entirely devoid of actuality that it is not worth while to record them in any detail, still less to consider their tactical meaning and effect. It is true that after 4 p.m. the *Majestic* and several of her division were rapidly overhauling the *Renown,* now the rear ship of the X line, but as the *Renown* was probably by this time out of action, and as several ships at the head of the B line certainly were, this really

FLEET ACTION, *August 9th.*

POSITION AT IV.

X Fleet. Course E.S.E.

B Fleet. Course S.E.



3.51. *Cæsar* and *Illustrious* left the line.

4.2 2nd Sub-division of B Fleet was ordered to chase the *Cæsar* and *Illustrious*.

makes no difference. The fact remains that after 4 p.m. the leading division of X and the rear division of B were practically out of range of each other, and it was only possible to maintain even the semblance of an engagement on the preposterous hypothesis that no casualties had happened since fire was first opened. This semblance was maintained with great solemnity on both sides for the best part of another hour, when reference to the umpires was proposed by Admiral Wilson and accepted by Admiral Domvile. The latter continued his course, while the former turned about to pick up his rear sub-division, which had been detached for the purpose of engaging the CÆSAR and ILLUSTRIOUS.

Results of the action considered.

The verdict of the umpires on the results of the whole action will be cited shortly. In the meanwhile, it seems not amiss to repeat that by all the probabilities of real war the decisive advantage must have rested with the B side. The only close action took place between the rear of X and the van of B. At the time when this action must have decided the fortunes of the day, the advantage of numbers and position belonged on the whole to X, but it was not a decisive advantage even at the time, and though the rear of X could at the same juncture receive only slight support from its van, and the van of B could receive no more support from its rear, yet this apparent advantage of X must have been largely neutralised by the fact that the van of X was getting at every moment further out of effective range even of the stricken van of B, and altogether out of range of B's still uninjured rear, while at the same time the uninjured rear of B was coming still more into range of the stricken rear of X. It seems almost impossible to resist the conclusion that the whole of the rear of X must have been annihilated, while even if we suppose that the whole of the van of B had suffered the same fate yet the result in that case would have been that X would have been left with only four ships, more or less injured, while B would have been left with seven ships, also more or less injured. X could only have averted this calamity by bringing his van back to the rescue of his rear, and even then the issue would have been doubtful. It would seem then that Admiral Domvile's eagerness to take an "obvious advantage" was hardly justified by results. He could, as Admiral Wilson said, "have avoided action altogether if he had wished to do so"; as he did not do so, although up to a certain point he had intended to do so, he was not perhaps altogether well advised to surrender the initiative to an adversary so well qualified to take advantage of it. The moral of the whole story is that an admiral who essays to fight a retreating and indecisive action is pretty sure

either to lose the day or to be compelled after all to fight on his adversary's terms, not on his own.

Independent action of CÆSAR and ILLUSTRIOUS with rear division of B.

The independent action between the CÆSAR and ILLUSTRIOUS on the one side, and the rear sub-division of the B fleet on the other, if regarded as an episode or sequel of the main action, can hardly be considered seriously. It was altogether outside the range of what would be probable or even possible in war. But regarded as an independent tactical exercise it was not without features of interest and instruction. It is described as follows in the narrative of the umpires:—

Turning now to the CÆSAR and ILLUSTRIOUS, which, at 4.10 P.M., as already stated, were endeavouring to regain their station in the line, it will be remembered that they were signalled to by the X Admiral to steer S.S.W. and rejoin at Lagos.

They therefore turned to S.S.W. and, as explained, under a wrong impression, prepared to engage the three B battleships who, accompanied by the armoured cruiser *Hogue*, were approaching from the northward and were then distant about 4600 yards.

Almost immediately afterwards firing commenced on both sides. The B Rear-Admiral signalling to his ships to form in line of bearing west from him and to concentrate their fire on the leading X battleship, which at that time and throughout the action was the CÆSAR. He shortly afterwards directed the *Empress of India* and *Hood* to fire at ILLUSTRIOUS, and the *Royal Oak* and *Hogue* at the CÆSAR, but from the returns these instructions do not appear to have been attended to, as the majority of the fire was directed against CÆSAR.

In the meantime the CÆSAR had ordered the ILLUSTRIOUS to take station on her port quarter, but, by alteration of course to starboard, this station appears to have become one of line ahead, in which the ships continued throughout the engagement.

The action now resolved itself into a running fight, in which the X ships on the exterior, engaged B on the interior circle, X continually altering course to starboard and thereby closing B, who kept away sufficiently to allow of his guns bearing, the range being gradually reduced from 4800 yards at 4.15 P.M. to 2500 yards at 5 P.M.

During this time the KING ALFRED was approaching from the eastward to the support of X, and a reinforcement to B was also rapidly approaching from the northward, composed of the B 1 cruisers *Edgar*, *Hawke*, *Dido* and *Venus*.

The KING ALFRED had been told to proceed direct to CÆSAR and ILLUSTRIOUS with all despatch, but she appears, notwithstanding her command of speed, to have found difficulty in joining her consorts, for her commanding officer states that, owing to the constant turning to starboard of those vessels, he found himself placed with the enemy's three battleships and the armoured cruiser directly between himself and the two ships to the support of which he was proceeding. He therefore abandoned the idea of directly supporting his battleships, and determined to engage the B armoured cruiser *Hogue* and the four protected cruisers which, at 4.50 P.M. were within range, and had been ordered by the B Rear-Admiral to attack him.

These vessels, under the command of the Senior Officer in the *Edgar*, disposed themselves in such a manner that they eventually bore from the KING ALFRED as follows: The *Hogue* nearly astern, the *Hawke* and *Venus* on the starboard and port quarter respectively, at ranges varying from 2700 to 1600 yards. The *Dido* and *Venus* engaged at a longer range on a bearing before the beam.

At this time the *Royal Oak* had forged ahead of her station and was within 2500 yards of the nearest X ship. At 4.46 P.M. the ILLUSTRIOUS fired a torpedo at her, the report stating that the *Royal Oak* at the time was right astern, steaming 14 knots, and did not alter her course to avoid it. A little later the CÆSAR also fired a torpedo at *Royal Oak* at a range of 2200 yards, and the *Hood* at 5.4 P.M. returned the attack by firing one at the CÆSAR.

At 5.7 P.M. the proposal made by B Rear-Admiral to "refer to the Umpires" was agreed to, and, as far as the battleships were concerned, firing ceased, except that the *Hood* was directed to turn her attention to the engagement then proceeding between the X armoured cruiser KING ALFRED, on the one hand, and the B cruisers already mentioned.

Another B cruiser had in the meantime appeared on the scene, the armoured cruiser *Drake*, then on her way to rejoin B fleet after her breakdown on the morning of August 8; she had observed the firing, and, altering her course, had closed

sufficiently to be within range at 5.24 P.M., and was directed to add one more to the number surrounding King Alfred.

The latter at 5.24 P.M. had declined to agree to "refer to the Umpires," but the arrival of the *Drake* was sufficient to show the hopelessness of continuing the action, and at 5.29 P.M. the Commanding Officer allowed that the attacking force was overwhelming, and agreed to cease firing.

The Rear-Admiral then ruled that the Cæsar, Illustrious and King Alfred were to be considered out of action on the one side, against *Royal Oak* and *Hawke* on the other.

An appeal made from Cæsar to include *Hogue* in the B ships out of action was not allowed.

It only remains to consider the Umpires' final Report and award. It is as follows: Final report of umpires.

Umpires' Report.

We have the honour to submit for the consideration of the Lords Commissioners of the Admiralty the following report on the operations carried out during the Naval Manœuvres of 1903:—

The object of the Manœuvres is not, as in former years, given directly in the papers issued from the Admiralty, but is contained in the General Idea, and was understood by all who took part in the operations to consist—Firstly, of the endeavour of B to combine his force (B 1) from northern waters with his available forces (B 2) at Madeira; and then, secondly, to engage X, known to be concentrating at Lagos, with the object of wresting from him the command of the sea which he held in those waters.

The problem of the junction of B 1 and B 2 had two aspects, the one, in which the highest speeds of the B 1 and B 2 squadrons would just enable them to meet at a point near the Azores, which X fleet at its highest speed, might or might not be able to reach first; the other, in which the junction would be effected, by strategy, at any other point within the limits made by the first case. An inspection of the sketch charts illustrating the plans of X and B Admirals, will show this clearly.

B Admiral trusting to the speed of his ships chose the westernmost point which he and B 2 could attain in a given time, and which calculation showed that X could not reach first, unless he steamed there direct at 16 knots.

As X fleet never was, at any time of the Manœuvres, able to go 16 knots, the junction took place, without hindrance, near to the appointed rendezvous, and only about two hours later than the estimated time. But even if X fleet had been able to steam 16 knots it would not have prevented the junction because of the deviation which the X Admiral made from the shortest line in order to pass through the Central Rendezvous.

His orders show, that X Admiral had provided for the chance of a junction at any other point, and that he had planned to shape his course on the information he received from his cruisers. The one sure thing that he had in his favour was that his fast cruisers could be at Madeira before B 2 left it, and they were!

If information reached him from them promptly, the plans he had laid might have enabled him at 16 knots to have run down B 2 before the junction took place, provided B 2 had failed to maintain 14 knots. The information, in spite of the losses in cruisers caused by breakdowns, came promptly and accurately from the Cruiser Admiral, for the two days that B 2 was proceeding steadily to the N.W., but X fleet lacked the speed, the junction was not prevented, and the first part of the Manœuvres ended in favour of B.

Next, in pursuance of his ultimate object, B sought for X and found him; each fleet was short of one battleship, and the *Mars* limited the speed of B fleet to 11 knots. X, intending first to rejoin his battleship, tried to avoid, and B to force on, an action, and he so far succeeded that he tempted X to engage his leading division while keeping on at his highest speed.

B strove hard to keep touch with X, by ordering what was practically a general chase of X's rear division, and when he found that his fleet was being drawn out and separated, and that he was unable to prevent X's passing out of his reach, he discontinued the action.

The result of the general engagement, which includes the separate action of the detached ships, according to the probabilities of war, was, that on B's side, three battleships, one armoured and one protected cruiser were disabled; five battleships were damaged and one protected cruiser was lost. Whilst on X's side one battleship and one armoured cruiser were lost, two battleships disabled, and one battleship damaged.*

* The *Good Hope* and Bacchante are considered only temporarily out of action and to have returned to their defended ports.

By a "disabled ship" we understand a ship that cannot be made efficient except by extensive repair in a dockyard, whether such a ship is temporarily captured by the enemy, sunk—as would probably happen in the case of a vessel entirely disabled —or recovered by her own side, is immaterial, as regards the fighting force that remains; if anything, the charge of such vessels would weaken, because they would hamper any fleet that was far from its naval base.

We are also of opinion that though the ILLUSTRIOUS was entirely disabled when she left her fleet, there is no practical way in which B fleet can be compensated for her having taken a small part in the separate action. Taking all the circumstances into account it is improbable that the CÆSAR would ever have left the line if the ILLUSTRIOUS had not been able to follow her.

Judged, therefore, by the probabilities of war, and considering that the undamaged portion of X fleet was much superior to the undamaged portion of B; that B in effecting the junction had expended more coal than X, and that B 1 was further from its base than X fleet was from Gibraltar, and that on the morning of the 11th X had joined his missing battleship and armoured cruiser, though he had lost the VENERABLE by a machinery breakdown, we are of opinion that at the end of the Manœuvres the command of the sea in those waters still remained with X.

Criticism of the above.

Some exception may, perhaps, be taken to the phrase here twice used, "the command of the sea in those waters." This phrase is not to be found in the official instructions nor is it entirely consistent with the assumption on which those instructions are founded—namely, that "the contest for the command of the sea between the two maritime countries B and X has been in progress for some time." It is part of the same assumption that "in the waters approximately between Gibraltar and Madeira X has been victorious and B driven, with loss, into his defended port at Madeira." Had the fleet driven with loss into Madeira been the only naval force at the disposal of the B side, and had it been unable to take the sea after its defeat, no doubt it might have been said that the command of the sea had passed without qualification to X. But that is precisely what had not happened. There was another B fleet within striking distance, and not only had this fleet been victorious against its immediate adversary, but it was preparing to strike again, while the stricken B fleet at Madeira was itself so far from disabled that it was ready to take the sea again within a few hours of the time when the victorious X fleet left Lagos. On the great principle that "the sea is all one" it seems impossible to affirm that, in the circumstances supposed, the X fleet held the command of the sea in those or any other waters. The late Sir Geoffrey Hornby defined "command of the sea" in words to the following effect: "I consider that I have the command of the sea when I can inform my Government that a military expedition may safely be transported across it." There can be no better or clearer definition, and if it be applied to the case in question, it is beyond dispute that in the situation which existed on the morning of August 5 no military expedition of any moment could have safely left Lagos or any other port in the X territory and been transported across the sea, say, for the reduction of Madeira or of any other position in the B territory.

All that can be said is that, whereas the command of the sea in those waters or in any other waters practically accessible to either side was still in dispute, yet the naval force of X was locally and temporarily superior to the naval force of B in the waters approximately between Gibraltar and Madeira. But this is a very different thing from saying that X held the command of the sea in those waters and the difference is vital not verbal.

Cruiser breakdowns.

The account which the Umpires give of the plans of the two sides, and of the course of events down to the close of the general action seems to invite little or no special comment beyond what has already been said in the foregoing narrative; but the mention of "the losses in cruisers caused by breakdowns" raises a very important question. The X fleet lost from this cause the services, partly or wholly, of the King Alfred, the Powerful, the Diadem, the Spartiate, and the Blake. These cruisers were all specially commissioned for the manœuvres. In other words, of the eight first-class cruisers with which the X fleet was provided for scouting purposes only three, the Bacchante, the Aboukir, and the Imperieuse, remained uninjured to the end, and of these the Imperieuse, owing to her indifferent speed, took very little part in the operations, while the Bacchante and the Aboukir were the only ships which had been for some time in permanent commission. The conclusion is irresistible that to commission ships with officers and crews entirely, or almost entirely, new to them only a few days—sometimes, indeed, only a few hours—before they are required to take part in the critical and trying operations of war, is to put an undue strain on human capacity and endurance, and to run a very serious risk of depriving a fighting fleet at some critical juncture of some of the most indispensable elements of its fighting efficiency. Occasional breakdowns there will be in any case, as is shown by the mishaps to the Venerable and the Exmouth in the X fleet, and to the *Empress of India*, the *Drake*, the *Hogue*, the *Sutlej*, and the *Æolus* in the B fleet. But the facts cited above show conclusively that the risk of mishap is appreciably greater in ships newly commissioned than it is in ships with which officers and men have had time to become familiar; and this being so the remedy is plainly indicated in the direction of having ships and men in reserve more closely associated together instead of, as has hitherto been the practice, keeping the ships in the basins and the men in barracks. It is understood that the Admiralty are already seeking a remedy in this direction, and in any case it has been stated by the Secretary of the Admiralty in the House of Commons that the greatest attention is being given by the Admiralty to the matter.

The umpires' award and its grounds.

The result of the general engagement is ostensibly assessed by the umpires "according to the probabilities of war"; but no indication is given of the *data* on which this assessment is based. It may, however, be inferred from the narrative of the umpires, which precedes their award, that a very large factor in their assessment is derived from the fire returns of the several ships engaged on either side. They lay stress on the fact that at 3.30 p.m., very shortly after the engagement became general, all the seven ships of the B van were firing exclusively at the ILLUSTRIOUS, the last ship in the X line. This would appear to be just one of those things which are almost inevitable in manœuvres when no effects of the fire of any ship can be discerned, but which would nevertheless be in the last degree improbable in real war. On the other hand it may very well be urged that all that the umpires had to consider was what actually happened, and that they could take no account of what might have happened, and probably would have happened, in the very different circumstances of actual war. To this argument no exception can be taken unless it be on the ground of the umpires' own appeal to "the probabilities of war." According to the real probabilities of war, though not perhaps according to the probabilities of proceedings which could not in real war have taken place as they did, it may very well be argued, as has been argued in the foregoing pages, that the action could not, in real war, have been fought as it was, nor could it have ended as it did. But this is a field of wide speculation and conjecture upon which the umpires, perhaps rightly, refrained from entering. As they did refrain, however, the force of their appeal to "the probabilities of war" must needs be materially weakened. After all, probabilities are essentially a matter of speculation and conjecture. The conclusion that "though the ILLUSTRIOUS was entirely disabled when she left her fleet, there is no practical way in which B fleet can be compensated for her having taken a small part in the separate action," seems to be rather a lame one. "Taking all the circumstances into account," the umpires continue, "it is improbable that the CÆSAR would ever have left the line if the ILLUSTRIOUS had not been able to follow her." It follows irresistibly that if one ship could not and the other would not have left the line, no separate action could have taken place; and in that case all the untoward consequences of the separate action, as allowed by the umpires, to the ships of the B fleet would have to be annulled, while the CÆSAR remaining in the X fleet astern of the RENOWN must surely have shared the fate assigned by the umpires to the latter ship of being "out of action, gun-fire silenced, ship disabled." The truth is that the umpires seem to have attempted an impossible task.

Taking the actual fire returns of the ships and the range at which their guns were in action, they have drawn their conclusions from these *data* doubtless with entire correctness. But these *data,* and the conclusions from them, have little or nothing to do with the real probabilities of war. The real probabilities of war must have been exhausted a very few minutes after action was joined ; the subsequent proceedings were merely a series of detached tactical exercises from which all probabilities of war were *ipso facto* eliminated. If, as is contended above, the action could not have been fought as it was nor have ended as it did, the search for probabilities of war in it is merely the pursuit of a shadow.

Conclusion.

For the same reason it is difficult either to endorse or to dispute the final conclusion of the umpires. Whether the undamaged portion of X fleet was or was not " much superior " to the undamaged portion of B is a question which depends entirely on the estimate which is formed of the results of the general action. If we accept the umpires' premisses their conclusion must also be accepted, but their premisses are not perhaps unimpeachable. Again, although it is true "that B in effecting the junction had expended more coal than X," yet the proposition "that B 1 was further from its base than X was from Gibraltar" is open to serious dispute. B 1's original base was Berehaven, which was doubtless assumed to be a fully equipped and defended port; but there is nothing in the official instructions to show that Madeira, the base of B 2, was not assumed to be a port of the same calibre and resources. If it was, then so far from B 1 being further from a practicable base than X was, it was actually several hundred miles nearer to it. Hence of the two principal reasons given by the umpires for awarding the final advantage to X, one seems to be open to grave dispute on its merits, while the other seems to be at variance with the conventions and assumptions on which the operations were based. The final judgment is that " at the end of the manœuvres the command of the sea in those waters still remained with X." It has been shown that " the command of the sea in those waters" was certainly not held by X at the outset, still less the command of the sea in general. If, as the umpires adjudge, it had passed to X at the end it must have been held not only "in those waters" but throughout the whole field of operations. The sea is all one.

James R. Thursfield.

CHAPTER IV.

Comparative Strength.

Ships in Commission.

During the past year there have been considerable changes in the composition of the British fleets in European waters. At page 61 of the *Annual* of last year it was urged that the strength of the British Mediterranean Fleet in battleships (not in cruisers) was excessive, and that the requirements for the defence of the Empire would be better met by the strengthening of the Channel Fleet at the expense of that in the Mediterranean. The grounds on which this opinion was advanced were: (1) The fact that the French Mediterranean Fleet only comprised six battleships in the Permanent Squadron, and three in the Reserve Squadron; (2) That repairs could be more economically and rapidly executed in the home dockyards than in the dockyard establishments abroad; and (3) That some, at any rate, of the enormous expenditure under the Naval Works Act on the Malta and Gibraltar dockyards could have been avoided had the Mediterranean Fleet not been increased in response to the agitation of a few years ago. The views set forth above were severely criticised in the Press, but they have been justified by the action taken by those responsible for the administration of the Navy.

Changes in British Fleets.

In the Mediterranean Fleet the number of battleships has been reduced from fourteen to twelve, and in the Channel Fleet has been increased from six to eight. The ships of the Royal Sovereign and Majestic classes, the Renown and the Vengeance, will, before these pages are published, have been replaced by three of the Duncan class, and the Queen and Prince of Wales just completed. The Mediterranean Fleet will thus be composed of eight battleships of the Formidable class, and four of the Duncan class. The cruiser strength of the fleet remains the same as last year. The British Channel Fleet will comprise eight battleships of the Majestic class. The Home Fleet at present includes six battleships of the Royal Sovereign class, and two of the Duncan class, the Exmouth and Russell, which have been relieved by the Queen and Prince of Wales in the Mediterranean. Two of the Royal Sovereign class will be replaced by the Swiftsure and Triumph, the two ships recently purchased, as soon as they are ready for sea. Though the number of battleships has been reduced from

ten to eight, the Fleet is certainly stronger than last year, owing to the relief of the older ships by more modern, more powerful, and faster vessels. The Cruiser Squadron has been reduced in numbers from eight to six, but here again the same remark applies. Four second-class and two third-class cruisers have been replaced by four of the Kent class just completed. The squadron is now composed entirely of armoured cruisers with a trial speed of 23 knots or over. From the above brief review it is clear that the First Lord of the Admiralty is fully justified in claiming, as he does in his Memorandum explanatory of the Navy Estimates, that the policy of composing the Home, Channel, Mediterranean and China Fleets of battleships of homogeneous classes has been steadily adhered to. In both the composition of our squadrons and the distribution of naval strength, there has been an improvement in the past twelve months.

French Mediterranean Fleet.

The French have in the Mediterranean, as last year, six first-class battleships in the Permanent Squadron and three in the Reserve Squadron. The latter, according to the Estimates, is to comprise only two battleships, the Brennus and Charles Martel. The Suffren has relieved the Jauréguiberry in the permanent squadron. In cruisers the French Mediterranean Fleet is exceedingly weak, but is to be strengthened during the summer by the addition of some of the new cruisers now in commission for trials, the Amiral Aube, the Kléber, and the Desaix, the Pothuau passing to the Reserve Division.

Further reduction in British Mediterranean Fleet desirable.

In the following table are given the number of battleships of all classes (including coast defence ships) in commission in European waters for the British and French Navies in 1894, 1899, 1903 and 1904 :—

	BRITISH.				FRENCH.				
					Mediterranean.			Northern Squadron.	
	Mediterranean.	Channel.	Home Fleet.	Total.	Active Squadron.	Reserve Division.	Total.		Total.
1894 .	10	4	3	17	8	6	14	6	20
1899 .	11	8	10	29	6	9	15	6	21
1903 .	14	6	10	30	6	3	9	5	14
1904 .	12	8	8	28	6	2	8	6	14

The force which the French maintain in full or partial commission on the Mediterranean Station has been in recent years much reduced, while the British Fleets have been increased. In view of the fact that the French Mediterranean Fleet now consists of only six battleships in the active squadron and two in reserve, and that, as

Class.	Great Britain. Mediterranean Fleet.	Great Britain. Channel Fleet.	Great Britain. Home Fleet.	France. Mediterranean Fleet. Permanent Squadron.	France. Mediterranean Fleet. Reserve [Ships].	France. Northern Squadron.	Germany. —
Battleships . .	Albemarle Bulwark Cornwallis Duncan Formidable Implacable Irresistible London Montagu Prince of Wales Queen Venerable	Cæsar Hannibal Jupiter Magnificent Majestic Mars Prince George Victorious	Emp. of India Hood Revenge Resolution Royal Oak Royal Sovereign Exmouth Russell	Bouvet Charlemagne Gaulois Iéna Saint Louis Suffren	Brennus Carnot Charles Martel	Formidable Henri IV. Masséna Bouvines Tréhouart	K. Friedrich III K. Wilhelm II K. Wilhelm der Grosse K. Barbarossa K. Karl der Grosse Mecklenburg Wittelsbach Wettin Zähringen
Cruisers, 1st Class .	Aboukir Bacchante	Bedford Hogue	*Drake *Good Hope *Berwick *Donegal *Kent *Monmouth	..	..	Jeanne d'Arc Marseillaise	Prinz Adalbert Prinz Heinrich
Cruisers, 2nd Class .	Arrogant Furious	Doris Hermes	Edgar Hawke Dido Venus	Pothuau Chanzy Latouche-Tréville	..	Dupleix† Guichen	..
Cruisers, 3rd Class .	Hermione Intrepid Naiad Pandora Panther Pegasus Pioneer Pyramus	Pactolus Prometheus	Mersey	Du Chayla Galilée Linois	..	Troude†	Amazone Ariadne Arcona Frauenlob Medusa Niobe
Torpedo-Gunboats .	3	..	..	1	4	1	..
Destroyers . .	20	..	24	6	..	7	..

* Cruiser Squadron. † Division Navale Atlantique.

pointed out in previous numbers of the *Naval Annual*, the naval strength of Europe is shifting from south to north, it appears quite unnecessary to maintain the British Mediterranean Fleet at its present strength, and that a further transfer of battleships from the Mediterranean to the Channel Fleet is desirable. If this view of the proper distribution of our naval forces be admitted to be sound, it follows that some of the enormous expenditure on the docks and dockyards at Malta and Gibraltar has already become unnecessary. An additional and very important reason for reducing the Mediterranean Fleet is the superior healthiness of the Home Station. The correspondent of one of the service papers writes on March 8th, "Fever is again very rife amongst the naval element."

In the French Northern Squadron the Masséna has relieved the coast defence ship Valmy, while the new cruiser Dupleix has taken the place of the Tage as flagship of the Atlantic Division, which is included in the tables with the Northern Squadron. The Bouvet and Carnot are to be transferred from the Mediterranean. The Formidable is to be put out of commission. The Northern Squadron, if the above changes provided in the Estimates are carried out, will comprise six battleships, of which three are of the first class. These ships are to be in commission only for six months with full complements. In the Estimates it was proposed to add the armoured cruisers Léon Gambetta, Condé and Gloire to the squadron as soon as completed, but the accident to the Léon Gambetta will delay her completion till next year, and the destination of the other cruisers may be altered owing to the outbreak of war in the Far East. French Northern Squadron.

Owing to the despatch of the Cesarevitch and Retvisan, as well as of the new cruisers, to the Far East as soon as they were completed, the force which Russia has at disposal in European waters is not formidable. It consists at the time of writing only of two first-class battleships, the Tria Sviatitelia and Kniaz Potemkine Tavritchesky, five second-class battleships (some of which are being refitted) in the Black Sea, and five other second-class battleships in the Baltic, including the Nicolai I., which was in commission in the Mediterranean. Three first-class battleships should be completed this summer. In addition, the Russians hope to have the new battleship Orel ready. Russia.

The German Navy Estimates for 1904 provide for (1) an active service fleet, comprising thirteen battleships and four coast-defence ships; (2) a reserve division of two coast-defence ships; (3) a cruiser squadron consisting of two large and six small cruisers. Four battleships of the Kaiser class and four of the Wittelsbach class are in commission in the First Squadron, to which one first-class and three third-class cruisers have been added. In the Second Squadron there Germany.

are four coast defence battleships of the Beowulf class, which have been reconstructed.

Italy.

The Italians during the present year will have in commission in the Mediterranean for seven months with full complements and for five months with reduced crews the following vessels: six battleships—Regina Margherita, Benedetto Brin, Sardegna, Re Umberto, Saint Bon, and E. Filiberto; four armoured cruisers—Garibaldi, Varese, Carlo Alberto, and V. Pisani; two cruisers—Fieramosca and Stromboli; four torpedo gunboats and six destroyers.

To sum up, in European waters in commission we have twenty-eight first-class battleships. The French will have in the summer, if the programme of reliefs is carried out, fourteen battleships in commission, of which eleven are of the first class and three of the second class, while the Germans have in commission eight first-class battleships, the Russians not more than three battleships, all of the second class. Clearly we are up to the two-power standard in immediate readiness for war. Were it not for the necessity of giving practice at sea to the large number of men added in recent years to the permanent force, some reduction would be possible in the number of British battleships in commission.

The Far East.

The British China Squadron comprises five battleships, as compared with four last year. The Centurion, having been re-armed with ten 6-in. guns in casemates in place of her ten 4·7-in. guns, has been added to the squadron. The Vengeance has replaced her sister ship the Goliath. The cruiser strength of the squadron remains the same—the Leviathan having relieved the Argonaut and the Sirius the Pique. The number of sloops and gunboats has, we are glad to note, been reduced from eleven to eight.

France.

The French Squadron in Eastern Asia has been considerably strengthened during the past year by the addition of the first-class cruisers Gueydon (9367 tons), sister ship to the Montcalm, while the Sully (9856 tons), of the Condé class, and possibly others of the new cruisers are to join the squadron as soon as their trials are completed. The third-class cruisers Pascal and Bugeaud, which have been six years in commission, are said to be unable now to steam more than from 16 to 18 knots. The old battleship Redoutable and the old armoured cruiser Vauban, which are in reserve at Saigon, can hardly be considered effective. The value of Saigon as a base has been severely criticised in a recent number of the *Yacht*. There is but one dry dock capable of taking large vessels, the second dock is only available for gunboats. The coal stores are inadequate, and the squadron cannot be rapidly coaled from them. The dockyard from the point of view of *personnel* and equipment leaves much to be desired. The dock-

yard labourers are natives. The refit of the Bugeaud occupied six months.

The Italians have the cruisers Vettor Pisani, Piemonte and Elba in commission in the Far East. The Vettor Pisani is to be relieved by the Marco Polo and the Piemonte by the Puglia. Italy.

The Germans have in the Far East the German cruiser Fürst-Bismarck, the second-class cruisers Hansa and Hertha, five smaller cruisers, and four gunboats. Germany.

On the Asiatic station the United States have a battleship squadron comprising three first-class battleships, the Kentucky, Wisconsin, and Oregon, and the coast defence ships Monterey and Monadnock; a cruiser squadron consisting of the New Orleans, Albany, Cincinnati, Raleigh, and San Francisco, which are in China; a gunboat division of the battleship squadron, which is also distributed at various points in Chinese waters; and a number of gunboats and armed vessels in the Philippines. Of the battleship squadron the Kentucky is to return home. United States.

At the outbreak of hostilities the comparative strength of the Russian and Japanese Navies in Eastern waters was as follows: Russia and Japan.

I.—BATTLESHIPS.

RUSSIA.

	Tons.	Date of Completion.	Speed.	Armament.
Cesarevitch . . .	12,900	1902	18	4 12-in., 12 6-in., 20 3-in.
Retvisan	12,700	1902	18	Ditto ditto
Petropavlovsk . .	10,960	1898	16½	4 12-in., 12 6-in., 34 smaller.
Poltava	10,960	1898	16½	Ditto ditto
Sevastopol . . .	10,960	1899	16½	Ditto ditto
Peresviet	12,674	1901	18	4 10-in., 11 6-in., 16 3-in.
Pobieda	12,674	1901	18	Ditto ditto
JAPAN.				
Fuji	12,450	1897	18½	4 12-in., 10 6-in.
Yashima	12,300	1897	18½	Ditto ditto
Asahi	15,000	1900	18	4 12-in., 14 6-in., 20 3-in.
Hatsuse	15,000	1900	19	Ditto ditto
Mikasa	14,850	1902	18½	Ditto ditto
Shikishima . . .	14,500	1899	18½	Ditto ditto

The speed of a squadron being that of the slowest ships, the speed of the Russian Fleet was limited to that of the Poltava class, viz., 16½ knots. The Japanese battle fleet had, therefore, an advantage of nearly two knots in speed, and it was a more homogeneous fleet than that of the Russians. In offensive qualities the four newest Japanese battleships, carrying as they do two

more 6-in. guns, are slightly superior to any of their opponents. In defensive qualities they are superior to the Pobieda and Poltava classes, and at least the equals of the Cesarevitch and Retvisan. The Fuji and Yashima, which are practically copies of our Royal Sovereign class, carry only four of their 6-in. guns in casemates, and for this reason are slightly inferior to any of the Russian ships. Taking the fleets as a whole, they were very evenly matched, and the result of a battle between them would have probably depended on the relative qualities of the *personnel*. The Japanese, possessing the superior speed, had the enormous advantage of being able either to refuse or give battle as suited their purpose. The damage to four Russian battleships in the attacks on Port Arthur placed the advantage of considerable freedom of action at sea in the hands of the Japanese, so that at the time of writing we have no opportunity of deriving any lessons from an action between the battle squadrons.

II.—CRUISERS.

RUSSIA.

—	Tons.	Date of Completion.	Speed.	Armament.
			knots.	
Rurik . . .	10,933	1895	18	4 8-in., 16 6-in., 6 4·7-in., 18 small.
Rossia . . .	12,200	1898	20	4 8-in., 16 6-in., 12 3-in., 36 small.
Gromoboi . .	12,364	1900	20	4 8-in., 16 6-in., 6 4·7-in., 20 3-in., 36 small.
Bayan . . .	7,800	1902	21	2 8-in., 8 6-in., 20 2·9-in., 7 1·8-in.
Varyag . . .	6,500	1900	23	12 6-in., 12 3-in., 6 1·4-in.
Diana . . .	6,630	1902	20	6 6-in., 20 3-in., 8 1·4-in.
Pallada . . .	6,630	1902	20	6 6-in., 20 3-in., 8 1·4-in.
Askold . . .	6,000	1901	23	12 6-in., 12 3-in., 8 1·2-in.
Bogatyr . . .	6,500	1902	23	12 6-in., 12 3-in., 6 1·8-in.
		JAPAN.		
Asama . . .	9,700	1899	21	4 8-in., 14 6-in., 12 12-pr.
Tokiwa . . .	9,700	1899	21	4 8-in., 14 6-in., 12 12-pr.
Azuma . . .	9,400	1901	21	4 8-in., 12 6-in., 12 3-in.
Yakumo . .	9,850	1901	21	4 8-in., 12 6-in., 12 12-pr.
Idzumo . . .	9,750	1901	21	4 8-in., 14 6-in., 12 12-pr.
Iwate . . .	9,750	1901	21	4 8-in., 14 6-in., 12 12-pr.
Kasuga . . .	7,700	1904	20	1 10-in., 2 8-in., 14 6-in., 10 3-in.
Nisshin . . .	7,700	1904	20	4 8-in., 14 6-in., 10 3-in.
Chitose . . .	4,798	1899	22	2 8-in., 10 4·7-in., 12 12-pr., 2 6-pr.
Kasagi . . .	4,784	1898	22	2 8-in., 10 4·7-in., 12 12-pr.
Takasago . .	4,180	1898	23	2 8-in., 10 4·7-in., 12 12-pr.
Yoshino . . .	4,180	1893	23	4 6-in., 8 4·7-in., 23 3-pr.

In spite of recent additions to the Russian Fleet, the Japanese possessed a superiority in cruisers. The six armoured cruisers of the Asama class are certainly more powerful than any Russian cruiser, with the doubtful exception of the Gromoboi. The Rurik and Rossia are heavily armed, but their batteries, in which most of their guns

are mounted, are mere shell-traps. They were, moreover, at the outbreak of the war badly in need of a refit after their long absence abroad. The Bayan is a useful ship, but with her armament of two 8-in. and eight 6-in. guns she would have no chance against the Asama with her four 8-in. and fourteen 6-in. guns (ten of which are mounted in casemates), and very little against the Kasuga and Nisshin, which were built for the Argentines and purchased by the Japanese just before the commencement of hostilities. The Chitose or Yoshino, on the other hand, though they might be able to fight the Diana, could hardly be expected to hold their own against the Bogatyr class, which carry an armament of twelve 6-in. guns, eight of which are protected by armour. Of smaller cruisers the Russians only had the Novik, a new vessel of 3200 tons and 25 knots speed, of which type there were several in the Baltic, while the Japanese had eleven of various sizes with a speed of 17 to 20 knots.

In addition to the vessels already in the Far East a Russian Squadron, consisting of the battleship Oslabya, sister ship to the Peresviet, the old armoured cruiser Dmitri Donskoi, the second-class cruiser Aurora, sister ship to the Pallada and Diana, four destroyers, and two torpedo-boats, passed through the Suez Canal immediately before the outbreak of hostilities. The Oslabya is now on her way back to the Baltic. The Almaz, a third-class cruiser of the Novik type, was detained at Algiers on her way to the Far East owing to a damaged propeller.

The above comparison of the naval strength of the two Powers in the Far East shows that the Japanese had a fair prospect of being able to meet the Russian Fleet with success, and it must be borne in mind that with one exception, the Tria Sviatitelia, all Russia's completed first-class battleships, and all her first and second-class cruisers, were either in China or on their way there. Even if the difficulty of coal-supply could have been overcome by coaling from colliers at sea, the Russians had no squadron in home waters which could have been despatched as a reinforcement, with any prospect of being able to hold its own in the probable event of its meeting with the Japanese battle fleet before reaching its destination. Of the ten Russian second-class battleships half are in the Black Sea, and of these the Sinope class are being refitted.

Relative position if the war had been delayed.

But a delay of a year would have completely altered Japan's prospect of success. The Russians have five powerful battleships completing, of which three will probably be in commission before the end of the year, and one, the Alexander III., is reported to be nearly ready for sea. They have laid down four more battleships during the past year, while the Japanese have just ordered two in England.

The relative strength of the two navies at the end of 1904 would have been as follows had war not broken out:—Completed battleships, first-class; Russia thirteen, Japan six; Second-class, Russia ten, Japan none.

Sloops and gunboats.

The changes in the composition of other British squadrons are so fully described in the First Lord's Memorandum that they do not require to be noticed here. We have repeatedly dwelt in these pages on the number of sloops and gunboats maintained in commission in foreign stations, which are absolutely valueless for war purposes. They are distributed as follows: China eight; Australia five; East Indies two; Pacific one; West Indies two; South Atlantic three; Cape two; a total of twenty-three. In a letter recently published over the signature of Admiral Sir Edmund Fremantle, it is pointed out that these vessels have cost about one-and-a-half millions of money, and are manned by 3000 men. Some vessels of this class may possibly be necessary on certain stations, but in most cases they could be replaced, with advantage, by third-class cruisers. The sloops Cadmus and Clio have just been completed at a cost of over £180,000. For that sum a third-class cruiser can be built, with a speed of 20 knots, which would be of more value for war purposes than half-a-dozen Clios. Some reduction both this year and last has taken place in the number of sloops and gunboats in commission. It is to be hoped that this policy will be vigorously pursued by the Admiralty.

This chapter would be incomplete unless attention was directed to the large force now kept in commission by the United States. Including the ships on the Asiatic station, already referred to, and those a list of which is given below, the United States has now no less than ten first-class battleships in commission. A few years ago she had none. On the North Atlantic station there is a battleship squadron comprising the first-class battleships Kearsarge, Alabama, Illinois, Iowa, Maine, Massachusetts, and Missouri; a coast defence squadron comprising the third-class battleship Texas, and the coast-defence ships Arkansas, Florida and Nevada; and the Caribbean squadron consisting of the cruisers Olympia, Cleveland, Atlanta, four gun vessels, and two armed merchant vessels. Three cruisers are in commission on the South Atlantic station. On the Pacific station they have the first-class cruiser New York, the coast-defence ship Wyoming, and five smaller cruisers or gun vessels.

Classification of battleships.

Before dealing with the relative strength of navies on the basis of the number of ships completed and under construction, a word must be said as to the classification adopted in the *Naval Annual* for both battleships and cruisers, which differs widely from that

adopted in the Return of Fleets (commonly called Sir Charles Dilke's Return), issued by the Admiralty. In this Return the battleships classified into First and Second Classes in the *Naval Annual* are included in the First Class. There is something to be said in favour of this arrangement, though the British Admiral class, the French Marceau class, the Russian Tchesme, and the Italian Lepanto or Dandolo, are quite unfit to be classed with our Majestics, Formidables, or many foreign battleships. There seems to be no good reason for maintaining the distinction between the Second and Third Class battleships. All would be used in case of war for the same service. It also seems unreasonable to swell the total of foreign armoured vessels by the inclusion in the case of Germany and France of a large number of armoured gunboats, and in the case of Russia of a number of coast defence ships between 35 and 40 years old.

The Admiralty classification of cruisers is open to some serious criticism. The armoured cruisers are classified by themselves. This leads to the Orlando class, the Bruix class, and the Dmitri Donskoi being classified with the Cressy and the Drake. Moreover, it was long contended by those responsible for Admiralty designs that a strong protective deck afforded better protection than a water-line belt of moderate thickness. The protected cruisers Powerful and Terrible were the answer to the armoured cruiser Rurik. Though we have always maintained in the *Naval Annual*, and though we fully believe that it is better to apply a given weight of armour to prevent a shell from entering a ship rather than to neutralising its effect after it has entered, the Diadems and the Powerfuls ought to be classed with the foreign armoured cruisers which they were designed to meet. Turning to the smaller classes, there seems a clear dividing line between the Highflyers and Talbots, which are already or about to be armed with 11 6-in. guns, and the Apollos, the French Bugeaud, and the Russian Boyarin, which are little more than half their size, and carry about half their armament. The inclusion of such ships as the Vauban and the Pylades in the Admiralty Tables is difficult to explain. As a means for enabling the public to ascertain the relative strength of navies, the return issued by the Admiralty appears misleading. The classification adopted in the *Naval Annual*, though no doubt open to criticism in points of detail, does, we believe, give a fair approximation to the relative strength of navies both in battleships and cruisers.

Classification of cruisers.

The changes in the Comparative Tables this year are of slight importance, beyond the additions of the new ships laid down, and

Relative strength.

the elimination of a number of ships of doubtful efficiency. The Alexandra, which has been struck off the British Navy list, is certainly a more powerful ship than the French Redoutable, the Russian Peter Veliky, and the German Kaiser and Deutschland, which, though still on the Navy Lists of their respective countries, have been eliminated from the tables. No comparison would be fair to the British Navy which excludes the Dreadnought, but includes such ineffective ships as the Tempête, the Tonnerre, the Vengeur, and the Duilio. The latter have therefore been removed from the list of coast defence ships. The effect of the additions is to alter the relative strength of navies, which can best be estimated from the number of first-class battleships. Germany and the United States now stand ahead of France. No less than six first-class battleships, excluding the Swiftsure and Triumph, have been completed for the British Navy as compared with Germany two, Russia two, Italy two, the United States one, and France one. The present position is as follows:—

	England.	Germany.	United States.	Russia.	France.	Italy.
Battleships 1st Class—Built ..	38	14	11	10†	11	4
,, ,, Building	10*	8	13	9	6	4
Total	48	22	24	19	17	8

* Includes Swiftsure and Triumph completing.

† Includes all battleships as before the war.

The above figures bear out very closely our forecast of last year. In completed ships we are equal to a combination of any three Powers. In ships built and building we are up to the two-power standard. Though first-class battleships constitute the chief element of naval strength, second-class battleships cannot be altogether left out of account. Of these we only have eleven as compared with twenty for France and Russia.

Future position.

Turning to the future, the relative strength in first-class battleships, when all those now on the stocks are completed, will be as shown in the table below, assuming that the period of construction does not in any case exceed 3½ years.

	England.	Germany.	United States.	Russia.	France.	Italy.	Japan.
1905 (end)	41	18	12	14	11	6	6
1906 (end)	45	20	17	15	13	8	8
1907 (end)	48	22	24	19	17	8	8

The above figures for Russia, of course, assume that the Russian Fleet has not been affected by the war. It is possible that the whole of the Russian Fleet in Port Arthur, which includes seven first-class battleships, will be taken or destroyed by the Japanese. As regards Germany, it is rumoured that a fresh battleship programme will be introduced this year.

In the cruiser classes our position is not unsatisfactory. We have forty-two first-class cruisers built and building as compared with fifteen for France, and thirteen for the United States, but it must always be remembered that the protection of our enormous shipping trade, and the vital necessity to us for free communication over sea, makes a heavier demand on our own than foreign navies.

Is our shipbuilding programme sufficient to obtain that command of the sea which is indispensable to our commerce and our very existence as a nation? Ten years ago there was only one navy, that of France, which could bear any comparison with our own. To-day, Germany possesses more first-class battleships than France, and the United States as many as France. While in France a limit has been set to the growth of naval expenditure, Russia, Germany, and the United States are devoting larger sums every year to increasing their navies, as the following table will show:—

ESTIMATED NAVAL EXPENDITURE OF THE PRINCIPAL POWERS.

	1894–5.		1899–1900.		1904–5.	
	Total estimates.	Voted for new construction.	Total estimates.	Voted for new construction.	Total estimates.	Voted for new construction.
	£	£	£	£	£	£
Great Britain (*a*)	17,366,100	4,814,372	26,594,500	9,257,603	36,889,500	12,098,092
France (*b*) . .	10,702,861	3,051,247	12,082,627	4,329,884	12,517,273	4,554,474
Germany . .	4,137,467	686,765	6,485,797	2,182,379	11,059,908	3,477,972
Italy	3,993,515	1,000,000	4,275,025	851,852	5,087,642	848,000
Russia (*c*) . .	5,692,377	2,255,627	8,652,602	3,548,181	11,835,669	4,035,776
United States (*d*)	5,577,182	2,491,005	9,678,053	2,094,400	21,137,664	7,444,130

The figures in the above table are compiled from the present and past numbers of the *Naval Annual*. Owing to differences in the form in which the estimates are made up no tabular statement is reliable in comparing one country with another. This applies especially to Russia, for the reason given in (*c*).

(*a*.) GREAT BRITAIN.—In 1894–5 there were no annuities in repayment of advances in connection with the Naval Works Acts. In 1904–5 the Total Estimates include £634,238 under this head. For new construction the British figures include the cost of gun mountings, which are not included in the new construction estimates of other European countries. Of late years this item alone would amount to about three-quarters of a million sterling.

(*b*.) FRANCE.—For comparative purposes in the Total Navy Estimates with previous years the figures for 1904–5 should be increased by over a million sterling, being the cost of the French colonial forces which before 1900 appeared in the French Navy Estimates.

(*c*.) RUSSIA.—An extraordinary grant of £11,500,000 in 1897 was probably distributed over a later period for new construction. The omission of this factor invalidates many recent criticisms which neglected to take it into account in comparing the expenditure of Great Britain and the Dual Alliance.

(*d*.) UNITED STATES.—The estimates under the head "Increase of the Navy" include Construction and Machinery, Armour and Armaments, and Equipment. The rise of the cost of new construction in the United States is significant in view of the fact that the vessels are net additions to the strength and not replacement of old tonnage, as must largely be the case with an old Navy such as the British Navy.

At the present moment the United States has no less than thirteen battleships under construction, Russia has nine; Germany eight; France six; whereas we have only eight. It is clear that, taking only European countries into consideration, increased exertions will be necessary if we are to maintain our Navy up to the two-power standard, and we must look forward to a time in the not far distant future when the United States will become a most serious competitor for the command of the sea. Our estimated naval expenditure, including naval works for the current year, amounts in round figures to £42,000,000. Our shipbuilding programme is hardly sufficient to maintain our Navy at the two-power standard, while no further increase in the already crushing burden of the Navy Estimates can be contemplated. The recent increase in naval expenditure is due to three causes: (1) The increase in expenditure on new construction; (2) the enormous additions to the permanent force and the consequent necessity of maintaining large numbers of ships in commission to give the men the necessary training at sea; and (3) the heavy expenditure on naval works. Our resources, great though they may be, are not equal to a continuance of the present policy in all these respects. The expenditure on new construction must be maintained at all costs. Economy must be sought in other directions. The extravagance of maintaining our Navy in time of peace practically on a war footing has been over and over again commented upon in the *Naval Annual.* More attention has recently been devoted by the Admiralty to Naval Reserves, and there is a satisfactory increase in the numbers voted for the various classes of the Naval Reserve in the estimates for 1904–5. On the other hand, the total numbers voted for the Navy show an increase of 4000 men. The time has come when the number of the Permanent Force should be reduced, and further and more vigorous steps taken to increase the Naval Reserve both in the Mercantile Marine and in the Colonies. The question of Naval Works was fully dealt with in the *Naval Annual* of last year. In certain cases we pointed out that our expenditure was extravagant and unnecessary. We referred especially to Rossyth, Dover, Malta, Gibraltar, Bermuda, and Simon's Bay. Further expenditure under this head must be more closely watched in the future than it has been in the past.

Comparative Tables of British, French, Russian, Italian, German, United States, and Japanese Ships.

TABLE I.—FIRST-CLASS BATTLESHIPS.

GREAT BRITAIN.			FRANCE.			RUSSIA.			ITALY.			GERMANY.			UNITED STATES.			JAPAN.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.			tons.			tons.			tons.			tons.
1891	Empress of India		1891	Brennus	11,190	1892	Tria Sviatitelia	13,318	1897	E. Filiberto ...	9,045	1891	Brandenburg ...		1893	Indiana		1896	Fuji	12,450
1891	Hood		1894	Carnot	11,954	1900	Kniaz Potem-		1897	Saint Bon... ...		1891	Kurfürst Fried-		1893	Massachusetts...	10,288	1896	Yashima	12,300
1892	Ramillies... ...		1893	Charles Martel	11,693		kine	12,480	1901	Rª Margherita	13,214		rich Wilhelm	9,874	1893	Oregon		1899	Asahi	15,000
1892	Repulse	14,150	1893	Jauréguiberry...	11,637	1894	Petropavlovsk†	11,384	1901	Benedetto Brin		1891	Weissenburg ...		1896	Iowa...	11,340	1899	Hatsuse	15,000
1892	Resolution ...		1895	Masséna	11,735	1894	Poltava		1903	*Rª Elena...* ...		1892	Wörth		1898	Kearsarge... ...	11,540	1898	Shikishima ...	14,850
1892	Revenge		1896	Bouvet	12,007	1895	Sevastopol ...	10,960	1903	*Emanuele III.* .	12,425	1896	Kaiser Fried-		1898	Kentucky... ...		1900	Mikasa	14,500
1892	Royal Oak ...		1895	Charlemagne ...	11,108	1898	Peresviet			*Roma*			rich III.		1898	Alabama	11,565		*A*	16,400
1891	Royal Sovereign		1896	Gaulois	11,105	1898	Oslabya	12,674		*Napoli*		1897	Kaiser Wilhelm		1898	Illinois			*B*	
1895	Renown	12,350	1896	St. Louis	11,090	1900	Pobieda						II.		1898	Wisconsin ...	11,653			
1894	Magnificent ...		1898	Iéna	11,861	1900	Retvizan† ...	12,700				1899	Kaiser Wilhelm	10,974	1901	Maine	12,300			
1895	Majestic		1899	Suffren	12,527	1901	Cesarevitch ...	2,900					der Grosse ...		1901	Missouri	12,230			
1895	Prince George...		1903	*Patrie*		1901	*Borodino*					1900	Kaiser Barba-		1901	*Ohio*	12,440			
1895	Victorious ...		1902	*République* ...		1901	*Alexander III.*...						rossa			*Georgia*				
1896	Cæsar	14,900		*Liberté*	14,630	1901	*Orel*	13,516				1899	Kaiser Karl der			*Nebraska* ...				
1896	Hannibal... ...			*Justice*		1902	*Kniaz Souvaroff*						Grosse			*New Jersey* ...	14,948			
1896	Illustrious ...			*Vérité*		1903	*Slava*					1900	Wittelsbach ...			*Rhode Island*...				
1895	Jupiter			*Démocratie* ...			*Imperator Pavel*					1901	Wettin			*Virginia*				
1896	Mars						*I.*					1901	Zähringen ...	11,643		*Connecticut* ...				
1897	Canopus						*Andrei Pervez-*	16,630				1901	Mecklenburg ...			*Kansas*				
1899	Glory						*vanonui* ...					1901	Schwaben... ...			*Louisiana* ...	16,500			
1898	Albion						Ioann Zlatoust	12,500				1902	*Braunschweig*			*Minnesota* ...				
1898	Goliath	12,950					Evstafi					1903	*Elsass*			*Vermont*				
1898	Ocean											1903	*Hessen*			*Idaho*	13,000			
1899	Vengeance ...											1903	*Preussen*	12,997		*Mississippi* ...				
1898	Formidable ...												*Lothringen* ...							
1898	Irresistible ...												*N*							
1899	Implacable ...	15,000											*O*							
1899	London												*P*							
1899	Venerable ...																			
1899	Bulwark																			
1901	Albemarle ...																			
1901	Cornwallis ...																			
1901	Duncan																			
1901	Exmouth	14,000																		
1901	Russell																			
1901	Montagu																			
1902	Queen	15,000																		
1902	Prince of Wales																			
1903	*Swiftsure*... ...	11,880																		
1903	*Triumph*																			
1903	*Edward VII.* ...																			
1903	*Commonwealth*																			
1903	*Dominion* ...																			
1903	*Hindustan* ...																			
1904	*New Zealand* ...	16,350																		
	Africa																			
	Britannia ...																			
	Hibernia																			
	48 ships.*	695,910		17 ships.	215,687		19 ships.‡	248,564		8 ships.‖	94,218		22 ships.§	256,557		24 ships.**	320,277		8 ships.	116,900

* 2 projected. † Sunk at Port Arthur. ‡ Several battleships are rumoured to be projected. ‖ Emanuele type projected. § 2 projected. ** 1 projected.

TABLE II.—SECOND-CLASS BATTLESHIPS.

GREAT BRITAIN.			FRANCE.			RUSSIA.			ITALY.			GERMANY.			UNITED STATES.			JAPAN.		
Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.	Launched.	Name.	Displacement.
		tons.			tons.			tons.			tons.									
1888	Nile	11 940 (Nile and Trafalgar)	1883	Baudin	11,442	1892	Georgi Pobiedonosetz	11,940	1880	Italia...	15,407									
1887	Trafalgar... ..		1879	Duperré	11,032	1891	Navarin	10,206	1883	Lepanto	15,549									
1886	Anson	10.600	1881	Courbet	10,368	1886	Catherine II. ...	11,048	1885	Andrea Doria...	11,027									
1885	Benbow	10,600	1879	Dévastation ...	10,535	1887	Sinope	10,181	1884	R. di Lauria ...	10,997									
1885	Camperdown ...	10,600	1885	Formidable ...	11,391	1886	Tchesmé	10,930	1885	F. Morosini ...	11,145									
1882	Collingwood ...	9,500	1886	Hoche	10,581	1894	Sissoi Veliky ...	10,400	1888	Re Umberto ...	13,673									
1885	Howe	10,300	1890	Magenta	10,680	1896	Rostislav	8,880	1890	Sardegna	13,640									
1884	Rodney	10,300	1887	Marceau	10,558	1889	Nicolai I.	9,672	1891	Sicilia	13,087									
1887	Sans Pareil ...	10,470	1887	Neptune	10,810	1887	Alexander II. ...	9,244												
1893	Barfleur	10,500 (Barfleur and Centurion)	1899	Henri IV. ...	8,807	1890	Dvenadzat Apostoloff ...	8,433												
1892	Centurion... ...																			
	11 ships.	117,250		10 ships.	106,204		10 ships.	100,934		8 ships.	104,525									

TABLE III.—THIRD-CLASS BATTLESHIPS AND COAST DEFENCE SHIPS.

GREAT BRITAIN.			FRANCE.			RUSSIA.			ITALY.			GERMANY.			UNITED STATES.			JAPAN.		
Launched.	Name.	Displace-ment.	Launched.	Name.	Displace-ment.	Launched.	Name.	Displace-ment.	Launched.	Name.	Displace-ment.	Launched.	Name.	Displace-ment.	Launched.	Name.	Displace-ment.	Launched.	Name.	Displace-ment.
		tons.			tons.			tons.			tons.			tons.			tons.			tons.
1882	Colossus	9,420	1885	Caïman	7,050	1894	Adm. Senjavin	4,792	1878	Dandolo	12,071	1880	Baden	7,283	1892	Texas	6,315	1882	Chin Yen* ...	7,220
1882	Edinburgh ...		1883	Indomptable ...	7,105	1893	Adm. Oushakoff	4,648	1876			1878	Bayern		1883	Amphitrite ...	3,990			
1871	Devastation ...	9,330	1885	Requin	7,078	1896	Gen. Adm. Apraxine ...	4,126				1877	Sachsen		1876	Miantonomoh ...				
1872	Thunderer ...		1881	Terrible	7,200							1878	Württemberg ...		1883	Monadnock ...				
1881	Conqueror... ...	6,200	1892	Bouvines	6,691							1884	Oldenburg ...	5,118	1883	Terror				
1885	Hero		1893	Tréhouart... ...	6,671							1889	Siegfried	4,048	1891	Monterey	4,084			
			1892	Jemmapes ...	6,474							1890	Beowulf		1884	Puritan	6,060			
			1892	Valmy								1891	Frithjof		1900	Arkansas	3,235			
			1877	Fulminant ...	5,871							1893	Hagen		1900	Nevada	3,228			
			1883	Furieux	5,925							1892	Heimdall		1901	Florida	3,235			
												1892	Hildebrand ...		1900	Wyoming ...	3,218			
												1894	Odin							
												1895	Ægir	3,474						
	6 ships.	49,900		10 ships.	66,539		3 ships.	13,566		1 ships.	12,071		13 ships.	66,060		11 ships.	45,335		1 ship..	7,220

* Of doubtful efficiency.

TABLE IV.—FIRST-CLASS CRUISERS.

GREAT BRITAIN.			FRANCE.			RUSSIA.			ITALY.			GERMANY.			UNITED STATES.			JAPAN.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
22	Powerful	14,200	21	Jeanne d'Arc...	11,092	20	Rossia	12,195	20	Giuseppe Gari-		19	Fürst Bismarck	10,482	21·9	Brooklyn... ...	9,215	21¼	Asama	9,700
22	Terrible		21	Gueydon		20	Gromoboi	12,359		baldi	7,294	20¼	Prinz Heinrich	8,759	21	New York ...	8,200	21½	Tokiwa	
20¼	Andromeda ...		21	Montcalm ...	9,367	21	Bayan	7,726	20	Varese		20¼	Prinz Adalbert	8,903	22	*West Virginia*		21	Adzuma	9.400
20¼	Diadem		21	*Dupetit Thouars*					20	*F. Ferruccio* ...		20¼	Friedrich Karl...		22	*California* ...		20	Yakumo	9,850
20¼	Europa	11,000	21	*Condé*...								21	*Roon*		22	*Colorado*	13,680	21	Idzumo	9,750
20¼	Niobe		21	Sully								21	*Deutschland*	9,348	22	*Maryland* ...		21	Iwate	
20¼	Amphitrite ...		21	*Gloire*	9,856								*Ersatz*		22	*Pennsylvania*		20	Kasuga	7,700
20¼	Argonaut	11,000	21	Marseillaise ...											22	*South Dakota*...		20	Nisshin	
20¼	Ariadne		21	*Amiral Aube* ...											22	*St. Louis*				
20¼	Spartiate		21	*Léon Gambetta*											22	*Charleston* ..	9,700			
21	Aboukir		21	*Jules Ferry* ...											22	*Milwaukee* ...				
21	Bacchante ...		21	*Victor Hugo* ...	12,351										22	*Washington* ...	14,500			
21	Cressy		21	*Jules Michelet*..											22	*Tennessee*... ...				
21	Euryalus	12,000	22	*Ernest Renan*...	13,347															
21	Hogue																			
21	Sutlej																			
23	Drake																			
23	Good Hope ...																			
23	King Alfred ...	14,100																		
23	Leviathan ...																			
23	Monmouth ...																			
23	*Kent*																			
23	Bedford																			
23	Essex																			
23	Berwick	9,800																		
23	*Cornwall*																			
23	Cumberland ...																			
23	Donegal																			
23	Lancaster ...																			
23	Suffolk																			
22¼	*Devonshire* ...																			
22¼	*Antrim*																			
22¼	*Argyll*																			
22¼	*Carnarvon* ...	10,700																		
22¼	*Hampshire* ...																			
22¼	*Roxburgh* ...																			
22¼	*Duke of Edinburgh*																			
22¼	*Black Prince* ..																			
22¼	*Achilles*	13,500																		
22¼	*Cochrane*																			
22¼	*Natal*																			
22¼	*Warrior*																			
	42 ships.*	488,000		14 ships.†	151,224		3 ships.	32,280		3 ships.	21,882		6 ships.‡	55,743		13 ships.‖	157,595		8 ships	73,550

* 3 projected. † C 16 projected. ‡ C projected. ‖ 2 armoured cruisers projected.

TABLE V.—SECOND-CLASS CRUISERS.

GREAT BRITAIN.			FRANCE.			RUSSIA.			ITALY.			GERMANY.			UNITED STATES.			JAPAN.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.	kts.		tons.
16	Impérieuse ...	8,400	20	Dupuy de Lôme	6,676	16¾	Adm. Nahimoff	8,524	20	Carlo Alberto ...	6,396	21	Kaiserin Augusta	5,956	22·8	Columbia	7,375	22	Chitose	4,798
16	Warspite		19	D'Entrecasteaux	7,995	18	Pamyat Azova	6,734	20	Vettor Pisani ...					23	Minneapolis ...		22	Kasagi	4,784
16	Aurora		23	Guichen	8,151	18	Rurik	10,933	19	Marco Polo ...	4,511	21	Freya		21½	Olympia	5,870	23	Takasago	4,180
16	Australia		23	Châteaurenault	7,898	16	Dmitri Donskoi	6,200				21	Hertha	5,569				23	Yoshino	4,180
16	Galatea		18	Bruix	4,735	20	Auror	6,731				21	Victoria Luise							
16	Immortalité ...	5,600	18	Chanzy	4,736	20	Diana	6,630				21	Hansa	5,791						
16	Narcissus		18	Charner	4,702	20	Pallada	7,081				21	Vineta							
16	Orlando		18	Latouche-Tréville	4,681	23	Askold	6,000												
16	Undaunted ...		19	Pothuau	5,374	23	Bogatyr													
21¼	Blake		19	Cécille	5,839	23	*Kagul*	6,645												
21¼	Blenheim	9,000	19	Tage	7,469	23	*Otchakoff*													
19¼	Crescent	7,700	23	Jurien de la Gravière ...	5,595	23	*Oleg*													
20	Edgar	7,350	21	*Desaix*																
20	Endymion ...	7,350	21	Dupleix	7,578															
19¾	Gibraltar	7,700	21	*Kléber*																
20	Grafton	7,350																		
20	Hawke	7,350																		
19¾	Royal Arthur ...	7,700																		
19¾	St. George ...	7,700																		
20	Theseus	7,350																		
19½	Diana																			
19½	Dido																			
19½	Doris																			
19½	Eclipse																			
19½	Isis	5,600																		
19½	Juno																			
19½	Minerva																			
19½	Talbot																			
19½	Venus																			
19	Arrogant ...																			
19	Furious	5,750																		
19	Gladiator																			
19	Vindictive ...																			
20	Hermes																			
20	Highflyer	5,600																		
20	Hyacinth																			
21	Challenger ...	5,880																		
21	*Encounter* ...																			
	38 ships.	243,510		15 ships.	96,585		12 ships.*	85,413		3 ships.	17,303		6 ships.	34,245		3 ships.	20,620		4 ships.	17,942

* 2 projected.

Table VI.—Third-Class Cruisers.

GREAT BRITAIN.

Speed.	Name.	Displacement.
kts.		tons.
17	Forth	
17	Mersey	
17	Severn	4,050
17	Thames	
19	Astræa	
19½	Bonaventure ...	
19½	Cambrian... ...	
19½	Charybdis ...	
19½	Flora...	4,360
19½	Forte...	
19½	Fox	
19½	Hermione... ...	
19¾	Æolus	3,600
20	Andromache ...	3,400
20	Apollo	3,400
19¾	Brilliant	3,600
19¾	Indefatigable ...	3,600
19¾	Intrepid	3,600
19¾	Iphigenia... ...	3,600
20	Latona	3,400
20	Melampus ...	3,400
20	Naiad	3,400
19¾	Pique	3,600
19¾	Rainbow	3,600
19¾	Retribution ...	3,600
20	Sappho	3,400
20	Scylla	3,400
19¾	Sirius	3,600
19¾	Spartan	3,600
20	Terpsichore ...	3,400
20	Thetis	3,400
20	Tribune	3,400
19	Magicienne ...	
19	Marathon ...	2,950
19	Melpomene ...	
20	Medea	2,800
20	Medusa	
19	Pallas	
19	Pearl	
19	Philomel	
19	Phœbe	
19	Katoomba ...	2,575
19	Mildura	
19	Ringarooma ...	
19	Tauranga... ...	
19	Wallaroo... ...	
20½	Pelorus	
20	Proserpine ...	
20	Pactolus	
20	Pegasus	
20	Perseus	2,135
20	Pomone	
20	Prometheus ...	
20	Pyramus	
20	Pandora	
20	Pioneer	2,200
20	Psyche	
21¾	*Amethyst*	
21¾	*Diamond*	,000
21¾	*Sapphire*	
21¾	*Topaze*	
25	*Adventure*† ...	2,750
25	*Attentive*† ...	
25	*Forward*† ...	2,545
25	*Foresight*† ...	
25	*Pathfinder*† ...	2,610
25	*Patrol* †	
25	*Sentinel*†	2,900
25	*Skirmisher*† ...	
	69 ships.*	215,995

FRANCE.

Speed.	Name.	Displacement.
kts.		tons.
19½	Coëtlogon	1,901
20½	Cosmao	1,923
20½	Forbin	1,935
20½	Lalande	1,965
20½	Surcouf	2,012
20½	Troude	1,994
20	Davout	3,031
20	Linois	2,308
20	Galilée	2,318
20	Lavoisier	2,285
20½	D'Estrees... ...	2,421
20½	Infernet	2,435
19½	Alger	4,313
19	Isly	4,406
19	Jean Bart... ...	4,044
19½	Bugeaud	3,809
19½	Chasseloup-Laubat	3,824
19½	Friant	3,882
19½	Pascal	3,951
19	Descartes	3,970
17	Sfax	4,561
20	Suchet	3,362
19	Cassard	3,890
19	D'Assas	3,962
19	Du Chayla ...	3,890
19	Catinat	4,048
19	Protet	4,001
	27 ships.	86,441

RUSSIA.

Speed.	Name.	Displacement.
kts.		tons.
17½	Adm. Korniloff	5,800
20	Svietlana	3,862
25	Novik	3,000
25	Boyarin	3,200
19	Almaz	3,285
24	*Jemtchug*... ...	
24	*Izumrud*	3,000
25	*Unnamed* ...	
	8 ships.	28,147

ITALY.

Speed.	Name.	Displacement.
kts.		tons.
20	Vesuvio	3 373
18	Etna	3,470
17½	Fieramosca ...	3,534
19	Stromboli... ...	3,836
21	Piemonte	2,597
19	Calabria	2,428
19½	Dogali	2,055
18	Elba	2,690
17½	Giovanni Bausan	3,277
19	Etruria	
18	Liguria	2,245
18	Umbria	
21	Lombardia ...	2,351
20	Puglia	2,498
	14 ships.	38,844

GERMANY.

Speed.	Name.	Displacement.
kts.		tons.
20	Gefion	4,044
20	Irene...	4,330
19	Prinzess Wilhelm ...	
23	Greif...	1,971
23	Hela	
21	Amazone	
21	Ariadne	
19	Gazelle	
21	Medusa	2,600
21½	Nymphe	
21½	Niobe	
21	Thetis	
22	Frauenlob ...	
22	Arcona	2,672
22	Undine	
22	*Bremen*	
22	*Hamburg*... ...	
22	*Berlin*	
22	*M*	
22	*Ersatz Merkur*	2,952
22	*N*	
22	*Ersatz Alexandrine*	
22	*Meteor*	
	23 ships.‖	66,478

UNITED STATES.

Speed.	Name.	Displacement.
kts.		tons.
18½	Detroit	
18½	Marblehead ...	2,089
18½	Montgomery ...	
16½	Cleveland... ...	
16½	*Denver*	
16½	Des Moines ...	3,400
16½	*Chattanooga* ...	
16½	*Galveston* ...	
16½	*Tacoma*	
20	Albany	3,437
20	New Orleans ...	3,600
20	Baltimore... ...	4,413
18	Chicago	4,500
19	Newark	4,098
19½	San Francisco...	
19½	Philadelphia ...	4,324
19	Cincinnati ...	3,213
19	Raleigh	
	18 ships.‡	61,613

JAPAN.

Speed.	Name.	Displacement.
kts.		tons.
20	Akashi	2,657
20	Suma	
19	Akitsushima ...	3,150
18	Idzumi	2,920
19	Chiyoda	2,450
20	*Niitaka*	3,365
20	*Tsushima*... ...	
17	Hashidate ...	
17	Itsukushima ...	4,277
17	Matsushima ...	
18½	Naniwa	3,700
18½	Takachiho ...	
	12 ships.	40,795

* 3 Projected. † Officially designated "Scouts." ‖ 3 projected. ‡ 3 Scouts Projected.

TABLE VII.—TORPEDO GUNBOATS.

GREAT BRITAIN.			FRANCE.			RUSSIA.			ITALY.			GERMANY.			UNITED STATES.			JAPAN.		
Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.	Speed.	Name.	Displacement.
kts.		tons.	kts.		tons	kts.		tons.	kts.		tons.	kts.		tons.				kts.		tons.
19	Grasshopper ...	525	17½	Condor	1229	20	Captain Sacken	742	20	Aretusa	833	19	Jagd	1230				21	Tatsuta	875
18½	Sandfly	525	17	Epervier	1268	20	Lieutenant Ilyn	714	20	Calatafimi ...	833	21	Komet	931						
20	Assaye		17½	Faucon	1311	22	Gaidamak ...		21	Caprera	833	21	Meteor							
20	Boomerang ...		18	Fleurus	1289	22	Vzadnik		20	Euridice	905									
20	Gleaner		17½	Vautour	1266	22	Griden		19	Goito...	843									
19	Gossamer		18½	Wattignies ...	1272	21	Kazarsky... ...	400	19½	Iride...	931									
20	Karrakatta ...		18½	Bombe	413	22	Posadnik		19	Minerva	833									
20	Plassy	735	18	Couleuvrine ...	369	22	Voevoda		19	Montabello ...	801									
20	Salamander ...		18	Dague	402	21	Abrek	535	19	Partenope... ...	821									
20	Seagull		18	Dragonne... ...	403				18	Tripoli	835									
20	Sharpshooter ...		18	Flèche	418				20	Urania	833									
20	Sheldrake ...		18	Lance	395				20	Saetta	395									
20	Skipjack		18	Sainte-Barbe ...	430				23	Agordat	1292									
20	Spanker		18	Salve...	406				23	Coatit										
20	Speedwell... ...		18½	Léger	509															
19	Alarm		18½	Lévrier	497															
19	Antelope		21½	Casabianca ...	974															
21½	Circe		21½	Cassini	966															
19	Hebe		21½	D'Iberville ...	952															
19	Jaseur		23	Dunois	889															
21½	Jason...	810	23	Lahire																
21½	Leda																			
19	Niger																			
19	Onyx																			
19	Renard																			
20½	Speedy																			
19	Dryad																			
19	Halcyon																			
19	Harrier	1070																		
19	Hazard																			
19	Hussar																			
	31 ships.	24,865		21 ships.	16,547		9 ships.	4,391		14 ships.	12,280		3 ships.	3,092					1 ship.	875

EFFECTIVE FIGHTING SHIPS, BUILT AND BUILDING.

Class.	Great Britain.			France.			Russia.			Italy.			Germany.			United States.			Japan.		
	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.	Built.	Building.	Total.
Battleships—																					
1st-Class	38	10	48	11	6	17	10	9†	19	4	4	8	14	8	22	11	13	24	6	2	8
2nd-Class	11	..	11	10	..	10	10	..	10	8	..	8	..	..	..	..	..	..	..	..	..
3rd-Class	6	..	6	10	..	10	3	..	3	1	..	1	13	..	13	11	..	11	1	..	1
Total Battleships	55	10	65	31	6	37	23	9	32	13	4	17	27	8	35	22*	13	35*	7	2	9
Cruisers—																					
1st-Class	28	14	42	5	9	14	3	..	3	2	1	3	4	2	6	2	11	13	8	..	8
2nd-Class	37	1	38	13	2	15	9	3	12	3	..	3	6	..	6	3	..	3	4	..	4
3rd-Class	57	12	69	27	..	27	5	3	8	14	..	14	12	11	23	14	4	18	11	3	14
Total Cruisers	122	27	149	45	11	56	17	6	23	19	1	20	22	13	35	19	15	34	23	3	26
Torpedo-Gunboats	31	..	31	21	..	21	9	..	9	15	..	15	3	..	3	..	..	..	1	1	2

* The total of United States battleships gives a somewhat exaggerated impression of present naval strength. Ten of the third-class battleships are monitors, but several are in commission on foreign stations, and must therefore be considered effective fighting ships.

† In the case of Russia no allowance has been made for losses at Port Arthur.

CHAPTER V.

The Principles and Methods of Armour Protection in Modern War-Ships.

Discussions on the defensive qualities of modern war-ships frequently disclose lack of knowledge of the history of the applications of armour, and a failure to appreciate the principles underlying its use. It may be useful therefore briefly to review the subject in both aspects.

At first, armour was used simply for the purpose of protecting ships of war against the destructive effects of percussive shells. When General Paixhans introduced horizontal shell fire (about 1824), he also indicated the necessity for armour protection on the sides of ships, and proposed the use of iron plates which would keep out shells. After investigation by a special Committee, the conclusion was reached by French authorities that the load of plating required would prove too great to be carried by sea-going ships. This conclusion was generally accepted, and acted upon in all Navies until the destruction of the Turkish Fleet by Russian shell-fire at Sinope (in 1854) recalled attention to the warnings of Paixhans. Napoleon III., aided by that great naval architect Dupuy de Lôme, broke away from this tradition; and, by the construction of the first armoured floating batteries (built during the Crimean War), and subsequent sea-going ironclads, of which La Gloire was the pioneer, he introduced a new era in warship construction.

Complete protection.

At the outset the arrangement of armour was extremely simple, as all ships were armed on the broadside principle. Ironclads were frigate-built, carrying nearly all their armament on the main deck. Their sides were cased with armour from the upper deck down to 5 or 6 feet below the waterline.

Warrior class: Unarmoured ends.

For a time the system of so-called "complete protection" alone prevailed—that is to say, throughout the limits of depth just mentioned the sides were clothed over with armour from stem to stern; the numerous guns were mounted at broadside ports cut through the armour between the main and upper decks. The Warrior and other of our first sea-going ironclads departed from this principle of complete protection. A considerable length at each end was left

without armour, and the main deck battery was completed by athwart-ship armoured bulkheads. Undoubtedly the principal reason for this adoption of "unarmoured ends" was the feeling that the sea-going qualities of the ships would be improved greatly, if the ends were relieved from heavy loads of armour required with complete protection.

Belt and battery system.

The serious dangers resulting from exposure of the steering gear, and the liability to easy perforation of the unarmoured ends in the region of the waterline, by even the lightest projectiles as well as by shells, soon led to the abandonment of the Warrior system of armour, and the adoption of complete protection in the vessels of the Minotaur class and in the "converted" ironclads built in 1861–63. As the weights of guns were increased, in order to obtain greater perforation and shell power, their numbers were diminished; shorter batteries consequently sufficed. Hence resulted the "belt and battery" system of armour, which the French used as early as 1859 in the Magenta and Solferino; these ships had double-storeyed central batteries amidships, associated with a belt of armour rising only to the height of the main deck before and abaft the battery. The Achilles and Northumberland of 1861 also had belts and batteries, and that system was adopted by Sir Edward Reed in his designs for broadside ships from 1862 to 1870. The batteries had a single storey in most cases, although in some instances the central batteries were double storeyed and were supplemented by detached batteries placed at the bow and stern to protect "chase" guns. In none of these ships was prominence given to horizontal (or deck) armour; the protection consisted simply of vertical side armour associated with bulkheads enclosing the batteries. The decks at the top of the armour belts, before and abaft the batteries, were of ordinary construction.

American "monitors" and early British turret ships.

In American "monitors" armed on the turret principle, introduced by Ericsson about 1862, the freeboard was exceedingly small. The vertical side armour, therefore, became a narrow belt, and the upper decks were very strongly plated. The few but heavy guns were mounted in revolving turrets. A very small target was exposed to gun-fire, but this involved slight "reserve of buoyancy," accompanied by great risk of foundering. The "cupola" turret-ships, introduced almost simultaneously by Captain Cowper Coles, had a greater freeboard than the American "monitors"; although this freeboard was very moderate when compared with that of contemporary broadside ships. In all these "monitors" and turret-ships the hulls were completely protected throughout the length to the upper deck. The armoured cupolas or turrets were set above that deck, strong iron plating being used upon the decks to complete the protection.

Breast-work monitors.

In the "breastwork monitor" system, introduced by Sir Edward Reed about 1866, after the Miantonomoh had visited this country, the low freeboard (to the upper deck) of the American "monitor" type was supplemented by a central armoured "breastwork" standing upon the strongly-plated upper deck. This breastwork was narrower than the upper deck and extended only over a portion of the length. The turret-bases were protected by the breastwork, and an iron protective deck was fitted on the top of the breastwork.

When the Dreadnought was re-designed by Sir Nathaniel Barnaby in 1873 the breastwork system was modified. The vertical armour was brought out to the full width of the ship, so forming a central battery within which the turret bases were placed. In the latest broadside ships also, such as the Alexandra, which were built in 1873–74, protective iron decks placed at the top of the belt were associated with vertical side armour.

Progress of armour, 1859–71.

Speaking broadly, therefore, it may be said that as the result of the first 14 or 15 years' experience with armoured ships there was a growing appreciation of the necessity for and value of horizontal or deck armour, while there was practically universal agreement that what may be termed the "hull protection" by vertical armour, should extend from the height of the main deck down to five or six feet below water. The disposition of the remainder of the armour was controlled by the disposition of the armament, and the protection demanded for guns and crews. In broadside ships this vertical armour was arranged in the form of batteries; in turret ships it was concentrated in turrets and in protection to the bases of the turrets, and to the mechanisms needed for revolving turrets, transporting ammunition, or working the heavy guns.

Armoured "conning towers" had also grown in favour, having first become prominent in connection with turret ships.

Admiralty Committee on Designs, 1871.

This brief statement must suffice to summarise the condition of affairs which prevailed at the time when Lord Dufferin's Committee on Designs (appointed in 1871 after the sad loss of the Captain) "took stock" of the Royal Navy and made suggestions in regard to the principles which should guide future construction. As a consequence of the recommendations of this Committee the "central-citadel" system was introduced in 1873. It was first embodied in the Inflexible and subsequently adopted in many other vessels. The thick armour was concentrated on a citadel of moderate longitudinal extent in relation to the total length of the ship. Before and abaft the citadel the defence consisted of a strong under-water armoured deck, above which the "unarmoured ends" were minutely sub-divided and reinforced by cork-packing, designed to assist the maintenance

Central citadel system.

of buoyancy and stability should the ends be seriously injured by shot and shell (or "riddled") in action.

French designers, when the reconstruction of their fleet was undertaken after the conclusion of the war with Germany, decided to build battleships in which the hull-protection was restricted to a shallow water-line belt, rising only about 2 to 3 feet above water, but carried to the usual depth below water. This belt was extended from stem to stern, and was associated with a protective deck situated at the height of the top of the belt. The vessels were built with considerable heights of freeboard. Their heavy guns were mounted in isolated armoured barbettes high above water, with shallow rings of vertical armour protecting the turn-tables. The floors of the barbettes were strongly plated, and armoured ammunition tubes of small diameter were fitted from the belt-deck up to the floors of the barbettes. The sides of the ships above the armour belt and the support to the barbettes were formed by thin structural iron or steel plates and stiffeners. There was a secondary armament of unprotected light guns on the main deck. French designers, in fact, boldly surrendered to easy destruction by shell fire, the sides and structure of the ships above the shallow armour belts; they did not protect the secondary armaments, restricting protection to the heavy guns. For a time they made no endeavour either by minute watertight subdivision or by cork packing to limit the spaces to which water could find entry if the thin sides were perforated near to the waterline. Their intention was to produce vessels carrying heavy guns high above water, so that they could be efficiently fought in a seaway, when the lower-placed guns of British turret ships with moderate freeboard would be either fought with difficulty or not be capable of fighting. To secure this superior offensive power they were prepared to sacrifice defensive power, as compared with contemporary British turret ships.

French designs, 1872-78.

Judged by smooth water tests, such as are ordinarily applied in discussions of the efficiency of armour protection, French ships of the period of 1872 to 1878 were sadly deficient in protection, and this feature was emphasised in consequence of the fact that most of these ships when completed exceeded their designed draught. The very small height above water originally contemplated for the armour belts was not obtained. On the other hand, when trials came to be made between the Impérieuse of the Royal Navy (which bore a close resemblance to the French type) and a turret ship of moderate freeboard, armoured on the central system—with turrets placed *en échelon* to give greater horizontal command—it was shown that, in comparatively moderate weather, when the Impérieuse could

fight her high-placed guns with perfect efficiency the ship of moderate freeboard with her guns near the water was practically unable to make an effective reply. This experience had much to do with the introduction into the Royal Navy of vessels of the Admiral class, and the practical abandonment of the turret type which (with certain modifications in the arrangement of armour) had persisted in the Royal Navy from the design of the Thunderer and Devastation in 1868–69.

Admiral class, 1880-83.

In the Admiral class—as I pointed out many years ago when controversies arose as to the merits of the design—the governing conditions were as follows:—First, definite limits of cost had to be conformed to; secondly, provision had to be made for certain qualities of speed, armament and protection, which it was considered would make the Admirals more than a match for contemporary vessels in the French and other foreign Navies. The hull armour consisted of a narrow waterline belt, and was associated with a strong steel deck at the top of the belt. This belt, however, was not carried to the bow or stern, extending over about 45 per cent. of the length, and having athwart-ship armoured bulkheads fitted at its ends. Before and abaft these bulkheads the protection consisted simply of a strong steel under-water deck, like that of the central citadel ships, and the space above the deck was minutely subdivided and assigned to the stowage of coal, stores, water, chain cables, etc., so as to diminish the unoccupied spaces to which the water could find access if the sides were "riddled" in action.

The restriction of the belt within these limits has been strongly condemned, and alleged to be markedly inferior to the continuous belt of French ships. In these criticisms, however, there was no fair appreciation of many important features in which the English ships were undoubtedly superior. For example, the Admiral class had cellular sides formed by longitudinal bulkheads extending from the belt to the main decks, and placed about ten feet away from the side plating. Cellular compartments were thus formed, and were minutely subdivided by numerous transverse bulkheads. It was also arranged to pack these spaces with coal or patent fuel as an additional protection. The principal watertight transverse bulkheads were extended to the main deck, instead of being stopped below the belt deck as in the French ships. The armoured barbettes for the heavy guns and the armoured ammunition tubes, also gave much better protection than that afforded by the corresponding features of French ships. Experience has proved that the disposition of armament in the British ships is more efficient; and although the French maintained their own system for many years, and critics

urged us to adopt it, in all recent French constructions our system has been followed. All other Navies have taken a similar course. Another feature, in which the Admiral class marked a new departure in British practice, was the association with heavy guns (placed high above water) of a powerful "secondary" armament of 6-in. guns and numerous quick-firers of small calibre. This secondary armament had only shield protection, while the heavy guns and their mechanisms were protected by thick armour.

German battle-ships, 1895.

It is interesting to note that when the reconstruction of the German Fleet was begun, about 1895, the designs of the battleships were largely influenced by considerations very similar to those above described for the Admiral class. In view of the sizes of the docks available, moderate dimensions were essential for the ships. Relatively high speed and powerful armaments were decided upon, and the defensive qualities were necessarily diminished as compared with those of the larger battleships then building for other Navies. The hull armour of these German ships took the form of a narrow water-line belt rising only two or three feet above water with a protective deck at its top; an arrangement similar to that of the French ships designed twenty-five years before, except that at the stern there was an "unarmoured end." The guns were placed at a great height above water in isolated and shallow barbettes or casemates, with small armoured ammunition tubes reaching down to the belt deck, and with unarmoured supports to the gun emplacements.

In many published descriptions of these German vessels their considerable offensive powers have been dwelt upon, while no notice occurs of the great sacrifices made in defence in order to increase offence. This is only one example, out of a multitude that might be mentioned, where criticisms have been limited to certain selected features, and a comprehensive or balanced appreciation of all the qualities of a design has been lacking.

British battle-ships, 1889. Royal Sovereign class.

When the first great programme for the reconstruction of the Royal Navy had to be considered in 1888, new conditions had come into play. The whole situation was then reviewed afresh; as to the disposition and character of armour and of armaments, speed, coal endurance and sea-going capability. The discussions which followed the reading of the papers which I contributed to the "Transactions of the Institution of Naval Architects," in 1889–92, contain the opinions of many leading authorities on war-ship design, and can still be consulted with advantage. Here it must suffice to say that —after full discussion by the Board of Admiralty, who called into Council a Special Committee of distinguished Naval Officers—it was

decided to adopt the features of armour and armament embodied in the design of the Royal Sovereign class.

Many changes were made from the Admiral class, including the following features:—First, high-freeboard throughout the length, instead of low extremities like those of the Admiral class, which had been found seriously to compromise the power of maintaining speed in rough water. Second, the association of a strong armour belt in the region of the water-line, and the usual protective deck at its top, with thin side armour reaching to the height of the main deck, about 9 or 10 feet above water. Third, the construction of barbettes for the heavy guns, which were fully armoured right down to the belt deck, instead of repeating the shallow barbettes and ammunition tubes of the Admiral class. Fourth, the adoption of the "casemate" system, giving protection to some of the 6-in. quick-firing guns. These changes in the distribution of the armour, and in the nature of the armaments, grew out of the then recent introduction of high explosives and quick-firing guns of larger natures. They involved the assignment of much greater weights to the armour, but they added enormously to the defensive power. The offensive power was also greatly increased, in the form of a powerful secondary armament.

Armoured barbettes and shields for heavy guns.

My personal representations to the Board had much to do with the change in the design for the barbettes and with the introduction of casemates. As regards the barbettes, it was obvious that—placed as they were in previous ships, high above the true armoured hulls, with only armoured ammunition tubes connecting them with the belt deck—there were great risks of serious damage and derangement in consequence of the introduction of high-explosives and of larger quick-firing guns. Consequently, it became essential to carry the armoured walls of the barbettes down to the belt-deck, notwithstanding the very large additions of weight and cost which were involved. Further, it appeared in the highest degree desirable that there should be no undue restriction of the space required for the effective working of the heavy guns as well as the rapid and safe transport of their ammunition. The barbette system was primarily governed by these considerations, and a heavy price had to be paid for the increased safety and efficiency which was secured.

There were at that time, and have since been, many proposals for diminishing the dimensions of barbettes, and so lessening the weight and cost of armour. No doubt, it might have been possible to work the guns in smaller barbettes, or to have restricted the dimensions, thickness and weights of the lower portions of the armour. This has been done in many foreign ships; but, in my opinion, the policy which the Admiralty has consistently maintained in battleships of

the Royal Navy—of making liberal provision of space and weight for the armoured enclosures and shields of heavy guns—has been wise and well-considered, although the size and cost of ships have been necessarily increased.

The work of the naval architect is, of course, simplified if any arrangement can be devised by which the weight of material needed for protection of the armament can be diminished. It is a fact that in many designs which have been proposed or adopted in other Navies for mounting and working heavy guns, considerable economies of weight have been effected as compared with the practice of the Royal Navy. My profound conviction is, however, that in resisting the introduction of similar arrangements into H.M.'s ships, the responsible administrators at the Admiralty have taken the best possible course; and that the additional expenditure which has thus been incurred and the larger dimensions of the ships which have been consequent, have resulted in greater fighting efficiency and better protection.

I trust that the time may never come when designs of the ships of the Royal Navy will be largely influenced by the remarks of amateur critics, imperfectly informed as to what is involved, and judging the merits of designs simply or chiefly by what naval architects have been able to accomplish on reputed or tabulated displacement tonnages. Repeatedly and publicly I have expressed the opinion that something much larger is involved in these debates than the credit or discredit of a particular naval architect. My belief is that when working under the same conditions of speed, coal-endurance, offence and defence, the skill and inventive power of naval architects in this and other countries, applied to a particular problem at a given date, will almost always result in the production of vessels of practically identical displacement. When extraordinary results are said to be achieved on relatively small displacements, and certain features have been unusually developed in a design, it is well to inquire closely—What has been sacrificed as compared with other designs?

Unarmoured ends in modern battle-ships.

One of the subjects most debated in connection with the distribution of armour is that relating to its longitudinal extension in the region of the water-line. It has been explained that, except in the Warrior, and a few other early ironclads of the Royal Navy, the water-line belt of armour extended throughout the length, up to the time when the "central citadel" system was introduced. The Committee on Designs of 1871 were of opinion that alternative methods of protection towards the extremities were preferable; provided they were associated with strongly armoured citadels

occupying a considerable portion of the length amidships, these citadels rising to about ten feet above water. The controversy in regard to the supposed dangers of "unarmoured ends" arose in connection with the design of the Inflexible, the first citadel ship, and was referred by the Admiralty to a Special Committee, which reported in favour of the central-citadel system. This deliverance, however, was not accepted by opponents of unarmoured ends; and prophecies of disaster in action to such vessels were numerous and gloomy. Less has been heard on this point since, at the battle of the Yalu, two Chinese ironclads—built in Germany on the central-citadel system—instead of being destroyed or made to "turn turtle," remained effective to the close of the day, and actually followed up the Japanese squadron on its withdrawal. Considering that the Japanese ships were armed with quick-firing guns, and were far superior in marksmanship to the Chinese, this object-lesson has great importance, particularly when it is known that the conditions of stability, and the extent of armour protection, in these vessels were much less favourable than the corresponding features in British ships. In previous discussions of this subject I have expressed the opinion which I still hold, namely, that the *longitudinal extension* of the armour is a matter of much less importance than its *vertical extension*, when considered in regard to the capability of battleships to maintain buoyancy and stability when attacked by modern gun fire. This critical feature—extreme narrowness of belt armour—was common both to French and British ships of the period under consideration. If armour protection is to be treated as a guarantee for the maintenance of buoyancy and stability in action, then it is a matter of certainty, demonstrable by calculation, that the vertical extension of the armour—in other words, the height to which it rises above water—is a matter of much greater importance than is the longitudinal extension of a narrow belt. It is unfortunately true of a very great number of these narrow-belted ships (both British and foreign) that, owing to additions made during construction or to other causes, the intended height of armour belt above water has not been attained in completed ships. As a result many of these vessels, when fully laden, have the top of the armour-belt less than a foot above water; and in some instances the belts are practically awash or under water. Under these circumstances it need hardly be said that the question of unarmoured ends becomes insignificant. Although many thousands of pounds have been spent on the hull-armour of such vessels, yet it has practically no value in maintaining buoyancy and stability. But this is not all that may be said on this matter. When the vessels are under way in smooth

water the tops of the belts at certain parts of the length are continuously under water, because of the rise of the waves on the sides. In a seaway, of course, the case is much worse, owing to the greater rise of the sea-waves and the rolling motions of the ships. Indeed, this type of ironclad really resembles a "monitor" in its armoured freeboard; and the towering superstructure—built above the belt to provide accommodation, and to carry high above water the armoured or other enclosures containing the guns—while of the greatest value from many points of view, does not contribute to the protection.

The great height at which these heavy weights of armour and armament are carried also raises the centre of gravity of this type so much, that—apart from the contribution of the unarmoured structure to stability—the vessels can have no practical range of stability. This is equally true whether the armour belt is carried to the bow or is stopped short and associated with unarmoured ends.

There is a periodical recurrence of this onslaught on unarmoured ends, and a complete ignoring of the fact that successive Boards of Admiralty and Committees of Advice, after investigating all the conditions, have affirmed the principle that it is best to concentrate defence towards the middle of the length, and to leave the ends either unarmoured or lightly armoured.

In 1889 when the designs of battleships to be built under the Naval Defence Act were referred to a special committee, this matter of protection towards the extremities was most carefully considered; after the controversies above mentioned in regard to central citadels and the Admiral class had occupied the public mind. My personal recommendation then was that the bow should be lightly armoured before the citadel in vessels of the Royal Sovereign class, chiefly with the intention to give greater power of maintaining speed should the bows of the vessels be struck when chasing an enemy. But the conclusion reached by the Committee, and affirmed by the Board after full consideration, was, that both ends of the ships should be left unarmoured and that an under-water steel protective deck with sub-division was the best arrangement, giving ample security against damage in action.

It has been explained that, so far as the maintenance of stability is concerned, the presence or absence of armour at the ends is of comparatively small importance. For the maintenance of "trim" when the ends are riddled it is, of course, conceivable that injuries forward might interfere both with manœuvring power and with the maintenance of speed. An unarmoured stern, however, could only produce changes of "trim" of a moderate character, not interfering with either speed or manœuvring power. In the later vessels of the

Formidable class and in the King Edward these considerations have led to the extension of the armour to the bow and to the abolition of the forward bulkhead of the citadel; the thickness of the side armour being gradually diminished towards the bow, the side armour carried to the height of the main deck, and strong protective deck plating being fitted at the top of the side armour. In some recent armoured cruisers a similar arrangement has been made and the bow has been lightly armoured for a certain length up to the height of the upper deck, in order to prevent riddling by light quick-firing guns and consequent check to the speed when chasing an enemy.

Having carefully studied the adverse criticisms of the British system of disposing armour towards the extremities of war ships, I am distinctly of opinion that the condemnation rests upon no solid ground, and leaves out of account many important considerations which have influenced Admiralty practice and added to the efficiency of His Majesty's ships.

Casemates.

In regard to the "casemate" system introduced into the Royal Navy in 1888–89, and since largely imitated in foreign Navies, there has been much misapprehension, and it may be useful to make a detailed statement.

When the use of high explosives, and the introduction of larger natures of quick-firing guns, made it obvious that protection must be found for the guns and crews of the secondary armament, two views were taken of the best method of procedure. One of these found an early and excellent illustration in the armoured cruiser Dupuy de Lôme; for which the design was prepared by my friend the late M. de Bussy, who has recently died full of years and honours. In the Dupuy de Lôme he reverted to the system of "complete protection," clothing over the sides with steel armour, about 4 inches in thickness, extending from the upper deck down to a few feet below water. Upon this armoured hull he placed a number of armoured turrets in which the guns were installed. This was a perfectly logical system; but like all arrangements it has drawbacks as well as advantages. For example, while this thin armour prevented explosion, within the ship, of high explosive shells having large "bursters," its presence actually determined the explosion of such shells at their points of impact and so tended to produce wholesale destruction of the armoured sides. Further, it was experimentally demonstrated that, with the small thickness of armour used, even of the best quality then obtainable, there was no need to use high explosive shells; with which there were unavoidable risks to the users. Chilled iron (Palliser) or suitable steel projectiles of small cost sufficed to perforate and drive into the vessel an amount of *mitraille* which

would inflict greater damage, over a larger area, than high explosive shells would cause. Furthermore, the great weight of side armour required for this system of protection and disposition of armament was useful only for the protection of the hull: separate protection, in the form of turrets, had to be devised for the guns. M. de Bussy fully recognised the possibility of serious damage being done, if the guns were placed in a battery formed by the side armour; and he preferred to accept the necessarily large weight of side armour rather than to incur the risks incidental to a battery, with concentrated guns and unavoidable points of weakness produced by cutting "ports" in the armour.

What was being done in France was, of course, perfectly well known to us, and it was not without the most careful consideration and discussion—including the collection of opinions from the highest British authorities in and outside the Navy—that my proposal to adopt casemates was approved. The principal reasons which led to this approval were as follows: We had only a moderate number of 6-inch guns to mount. It was desired to distribute these as widely as possible. It was preferred not to adopt the turret system, because that involved mechanical appliances for the revolution of the turrets, and did not give the same facility for the application of manual power, which was obtained when the protecting armour was fixed and the guns were mounted on centre pivots. In addition it was seen that the service of the ammunition could be more readily and certainly dealt with in the larger casemates than in the restricted space of a turret. The isolation of each gun and its crew in a separate enclosure was considered to be a great advantage; and the habitability of the crews' quarters, on the main deck amidships, was much increased, as the absence of side armour made easy the provision of natural light and air for the spaces in which a large proportion of the crew lived. This latter consideration, of course, was subordinate to the others mentioned. The character of the protection to be afforded in the casemates—including the thickness of the plating on the backs, as well as the front—was decided after careful trials in the Resistance, when 6-in. guns were used with high explosive shells, as well as with common shells and powder-bursters. There has been much criticism of the relative weakness of the backs of the casemates; but this has, to a large extent, arisen from ignorance of the results obtained in the Resistance, to which results it would obviously be undesirable for me to refer in detail. Looking back on the decision reached fifteen years ago, and having regard to all subsequent experience, as well as to the adverse opinions that have been expressed, it does not appear that there is any reason

to regret the adoption and extensive use of the casemate system in British ships.

Upper deck casemates.

One other point deserves notice, namely, the fact that the upper deck 6-in. quick-firing guns of the Royal Sovereign class were not fitted with casemate protection. Here again there was no oversight in preparing the design. At that time great importance was attached to keeping the upper deck as free and unencumbered as possible; and it was for that reason that casemates were not fitted. In the Renown, which I designed in 1892, four casemates were used on the upper deck, at the angles of the screen bulkheads, where they caused little obstruction. This has since been made the rule in later vessels. As is well known the number of the upper deck casemates has been increased in the latest battleships and cruisers, with obvious advantages to fighting efficiency at sea; and the old objection to obstruction on the upper deck has disappeared as the result of experience. In their recent refits effect has been given to the idea of fitting casemates on the upper decks in the Royal Sovereign class, the ships having been so designed that they could carry them safely.

Central batteries.

For many years past, in some Navies, there has been a reversion to central batteries, instead of casemates or turrets, for the protection of secondary armaments. In 1878 I prepared a design for a modified Inflexible, having turrets placed as in the Dreadnought and with a central battery containing a number of lighter guns. The Nile and Trafalgar (of 1885) had this disposition of armament and armour. But there were serious objections to so concentrated a battery, and it was not adopted in the Royal Sovereign class. French designers introduced a central-battery into the Brennus, launched in 1891. The Italians, in battleships and armoured cruisers built from 1890 to 1896, also adopted central batteries for 6-in. quick-firing guns; and similar batteries were introduced (about 1899) into designs for the Maine class of the United States Navy. A more recent example of this battery system is found in the Japanese battleship Mikasa, built by Messrs. Vickers, Maxim & Co., where the central battery is sub-divided by thick steel traverses running longitudinally in addition to traverses of the usual character placed transversely. Of course some advantages are obtained from central batteries, particularly as regards economy in weight of deck armour; since it is unnecessary to thickly plate the battery deck when there is substantial side armour protecting it; but there are also disadvantages.

These considerations were not overlooked in Admiralty practice when casemates were adopted: but the governing consideration, so long as the number of guns to be mounted permitted wide-

distribution, was that by using separate casemates there was an avoidance of serious risks run when a number of guns are mounted in a single-armoured battery, with necessarily weak positions at the gun ports, and with large numbers of men and considerable amounts of explosives crowded into one enclosure.

The use of traverses, of course, tends to reduce this risk: but does not by any means remove it. Suggestions have been made that, being the originator of the casemate system, I was naturally averse to change. This is absolutely incorrect, so also is the statement that a change in Admiralty practice followed my resignation. The point is of small importance; but, as a matter of fact, it may be stated that in my last battleship designs, which eventually took the form embodied in the King Edward class, I proposed the adoption of a central main-deck battery for the 6-in. guns. This recommendation was made because the adoption of 9·2 in. guns, as supplements to the 12-in. guns on the upper deck, made large demands on space, and greatly restricted the positions in which the 6-in. guns could be mounted. These guns were necessarily placed close together, and there was therefore no longer reason for locating them in separate casemates. The balance of advantage, in short, lay in the adoption of a central battery, from the point of view of the protection of the secondary armaments. It had the further advantage of facilitating the protection for the 9·2-in. guns and enabling a considerable reduction to be made in the weight of protective plating on the main deck.

From published accounts of the Duke of Edinburgh class of armoured cruiser—the first design prepared by my friend and successor, Mr. Philip Watts—it appears that the Admiralty has adhered to its fixed policy of giving to first-class cruisers a secondary armament identical with that adopted for first-class battleships of the same date. The arrangements for the 9·2-in. gun mountings and shields and the 6-in. gun battery in that design are understood to be identical with those introduced into the King Edward class.

It is unfortunate that writers on these subjects so often treat matters of policy in construction, governed by decisions of the Board of Admiralty, as if they were dependent on the personal opinions of gentlemen who may, for the time, be the responsible naval architects at the head of the Construction Department, but so much has been said on this subject that it is desirable to place the facts on record.

Present systems of protection for secondary armaments.

Unanimity of opinion has not been reached, and probably never will be, as to the best system of protection and disposition for the secondary armament. In our latest designs, and in those of the United States and Germany, central batteries have been adopted,

while Italy (which led the way in central batteries) as well as France and Russia are adopting isolated turrets, and Austria has passed from central batteries to casemates. The explanation of this diversity of opinion is to be found in the fact that armaments differ in character and disposition: while each system of protection has advantages and disadvantages. No general or permanent solution of the problem is possible under the conditions, and it is absurd to claim absolute superiority for any system.

Majestic class: system of hull armour.

Resuming the historical sketch of the disposition of hull-armour in war ships, reference must next be made to the Majestic class, laid down in 1894. In these ships the hull-armour was arranged differently from that in the Royal Sovereign class. These differences are shown in detail on cross-sections appearing in plates, Nos. 4 and 5. The protective deck towards the sides in the Majestic is turned down to the lower edge of the side-armour, instead of being continued horizontally across to meet the top of the armour belt as in the Royal Sovereign class. The thick armour belt is abolished and armour of uniform thickness is fitted throughout the length of the citadel up to the height of the main deck. This armour is also wrapped round the bases of the barbettes. This system of protection was proposed by me as an alternative to the Royal Sovereign class (in 1888), but the Board of Admiralty then preferred to adopt another arrangement. When the Renown was designed in 1892 I again submitted the modified system, and it was accepted by the Board.

The weight of armour in both cases is practically the same: the cost of armour of a given quality is less when the belt is abolished; the protection to buoyancy and stability, as well as to the vitals, is no doubt much improved. All experience shows that the chance of hitting becomes greater as the height above water increases. It is therefore unreasonable to mass armour in the form of a thick belt, extending over a very limited vertical space in the immediate region of the water-line. Comparing the Royal Sovereign and the Majestic, on the assumption of still water, it will be seen that, for a height of about three feet above the load-line, and to about one foot below, the Royal Sovereign has 18-in. armour, as against 9-in. in the Majestic. The established practice at the time of the Royal Sovereign design permitted the thickness of this armour to be rapidly diminished (in the vertical sense) towards the lower edge of the belt from about one foot below the load-line. From three feet above the load-line up to nine and a half feet (*i.e.*, to the height of the main deck) the protection in the Royal Sovereign consists of 4-in. steel, with suitable backing and supports; whereas, in the Majestic, the corresponding thickness is nine inches. With the same quality

of armour the resistance to perforation is about *five-fold* greater in the Majestic than in the Royal Sovereign for this important zone. Against shell-fire the difference is still more in favour of the later arrangement. In addition, it must be noted that by turning down the protective deck towards the side, as is done in the Majestic, the defence given by the vertical side-armour to the vitals is greatly reinforced. It is also possible, at the discretion of the commanding officer, to retain coal in the angular spaces above the protective deck behind the side armour, and so, with a moderate weight of coal, to increase defence considerably. The ammunition supply to the 6-in. guns has very much greater protection given to it in the Majestic, and the important longitudinal communications on the lower deck within the coal bunkers are very strongly defended, thus supplementing the still more valuable longitudinal ammunition-passages which have been provided below the protective deck. This system of protection has now found almost universal favour in all battleships and armoured cruisers, and the changes that have been introduced during the subsequent twelve years, since its earliest application in the Renown, chiefly have relation to the protection given to the extremities or to the arrangement of deck-armour.

Horizontal and deck armour.

Although it is a common practice to restrict the use of the term "armour" to thick vertical plating fitted on the sides, batteries, barbettes, casemates or conning-towers of ships, it is necessary to recognise the fact that from a very early period of the ironclad reconstruction great importance has attached to horizontal armour and to protective decks. Beginning with vessels of low freeboard the use of such decks has become general. Italian designers had the courage of their opinions and a quarter of a century ago in the design of the Italia and Lepanto, Signor Brin entirely abandoned side armour, and trusted for the protection of "vitals," buoyancy and stability simply to an under-water armoured deck, with minute subdivision of the water-line region. The great class of "protected" cruisers subsequently constructed also depend entirely for the protection of their vitals and the maintenance of buoyancy and stability upon similar arrangement. In most British ships of that class the central portions of the protective deck rise above water instead of being wholly below it as in the Italia class. Strong condemnation has been expressed of the policy maintained by the Admiralty up to 1895, in continuing the construction of protected cruisers after many foreign Navies had introduced various types of so-called "armoured" cruisers, with comparatively thin armour plating protecting more or less considerable areas of the sides, or with narrow water-line belts of greater thickness. These adverse criticisms usually ignore impor-

tant facts. Before coming to the conclusion to build protected cruisers the Admiralty and its technical advisers fully considered what was being done abroad, and, rightly or wrongly, reached the conclusion that the balance of advantage for the cruiser classes was secured by the adoption of protective decks—associated with coal protection and minute sub-division, and, in the larger classes, with casemate-protection added for the 6-in. guns—rather than in the use of thin and soft steel armour plating on the sides, or narrow belts.

It might be thought from some utterances on this subject that a magic virtue attached to the presence of vertical armour on the sides of a ship in any form, even if narrowly limited in extent. In tabulations of the fleets of the world it has often been the fashion to include in the "armoured" section, vessels having only small patches of armour in the region of the water-line, which armour was more often under water than above, and rarely constituted an important contribution to protection. As a matter of fact, there is, and can be, no practical difference in regard to protection, and the maintenance of buoyancy and stability, between a narrow-belted ship (in which side armour is associated with a horizontal protective deck) and a vessel of the protected class, in which the deck rises as high as the belt, and its lower edge is as deeply immersed as the belt, while coal protection is arranged at the sides. But there is a sensible saving in weight, with equal protection, and a considerable saving in cost of protective material, when decks are used and belt armour is omitted.

Armoured cruisers.

Prior to 1895 there were few vessels which could fairly claim to be described as "armoured" cruisers, in the sense that their sides were effectively protected over considerable areas by strong vertical plating. The Dupuy de Lôme of the French Navy was one of the first and most notable examples; she was followed by smaller French vessels (such as the Bruix) where the protected area was very greatly reduced, and the thickness of the plating somewhat diminished. In all these cases, as has been already stated, the thicknesses and defensive powers of the side-armour were distinctly inadequate. Palliser or other cheap forms of projectiles were most effective against these vessels. High explosives were not required, and true "armour-piercing" projectiles were unnecessary. Those who have seen the results of artillery experiments against lightly armoured and unarmoured structures, attacked by high-explosive shells and other varieties of projectiles, will know that, so long as the armour used was not more than 4 in. thick—although it was of the best quality obtainable up to 1896—there was no sufficient reason for preferring such a system of defence to that embodied in the designs of British protected cruisers.

My own recommendation during this period was always in favour of the limitation of side-armour to cases where the thickness and quality of armour and the extent of the protected area enabled an adequate defence to be provided against the attack of 6-in. quick-firing guns. In my judgment, the protected cruisers of the British Navy, designed prior to 1896, are in every way qualified to meet, on more than equal terms, the contemporary cruisers built for any foreign Navy and still on service. Their offensive and defensive qualities were determined upon with the intention of fulfilling this condition; and the results obtained in the completed ships justify the opinion that the intentions of the design have been fully realised. The relative fighting efficiencies of the great protected cruisers Powerful and Terrible, as compared with the Rurik and Rossia, which they were designed to meet, have been discussed elsewhere. In regard to the vessels of the Diadem class, which have been severely criticised as embodying inadequate offensive and defensive qualities in proportion to their dimensions, it may again be asserted that, for the services they were designed to fulfil, and when compared with foreign cruisers built or projected at the time of their design (1894), the Diadem and her sister ships were efficient protectors of commerce and communications. Owing to various circumstances, which had no relation to the design, the last completed Diadems occupied an extraordinarily long period in construction; and some of them were only recently brought into active service. But it is obviously unjust and unreasonable to compare the Diadem class with vessels designed many years after them, in which all subsequent improvements of materials, machinery, and armaments could be introduced. Yet some writers have maintained that there has been deliberate acceptance on the part of the Admiralty of an inferior type, and have left unnoticed the fact that these later foreign vessels have been met and overmatched by later British cruisers.

Modern cruisers.

Italian designers deserve and should receive credit for initiating the type of modern armoured cruiser. Financial limitations had much to do with the decision to build this class, which were much less costly than battleships, but superior in speed, although inferior in the power of the principal armament, and carrying only moderate thicknesses of armour. The Italians extended this moderate protection over considerable areas of the sides, and associated it with central batteries. Their aim was obvious—to produce a class of cruisers that could take part also in fleet-actions if required. It has always been a pleasure on my part to acknowledge these and other valuable suggestions, influencing my professional practice, which have arisen from the study of Italian methods. But until the improvements

of Harvey and Krupp in the manufacture of armour were brought into practical form, it was not possible, in cruisers of permissible cost and dimensions, to associate high speed and large coal-endurance with such thicknesses of armour over sufficiently large areas as were required to secure a proper standard of protection. Immediately after this condition was fulfilled, by the production of Krupp armour about six inches in thickness capable of resisting the attack of 6-in. quick-firing guns under fighting conditions, the design of the Cressy class was put in hand at the Admiralty, and followed in due course by the Drake class. The County class, as has been previously stated, were introduced subsequently as a reply to the smaller swift armoured cruisers (of 23 knots maximum speed) then building for Foreign Navies, and to the protected cruisers or "Corsairs" of equal speed, which had been constructed or proposed for the avowed purpose of destroying British commerce. The armament of the County class, as well as the protection, was regulated by the standard of power existing in or projected for these foreign vessels, and was decided upon by the Board of Admiralty. It needs no further comment from me. On the side of protection there can be no doubt that, taking into account the protected area and the defensive power of the armour employed, the County class are much superior to the smaller French armoured cruisers, such as the Desaix, and closely approach or equal the Montcalm class, and the Russian Bayan. The County class are immensely superior to recent protected Russian cruisers, such as the Variag, or the French and American protected Corsair cruisers, both in regard to powers of offence and defence, and these are the classes they were specially designed to meet, although their larger dimensions fitted them to deal also with the other classes mentioned. Having given this explanation of the governing conditions of the design for the County class, I may be permitted to add that my personal opinion has always been adverse to the construction of armoured cruisers with less than six inches of side armour, and this opinion was well known to the Board of Admiralty when it was decided to construct the County class. In my designs for later vessels of the class, 7·5-in. guns were introduced; and since my retirement, the design has been further modified in order to provide 6-in. armour, dimensions and cost having been increased while speed has been diminished. The fighting efficiency of these later vessels has thus been increased, partly by sacrificing speed; but it still remains true that the original design provided vessels of ample power for the particular service contemplated, and every intention of the design has been more than fulfilled. The screw propellers tried in the earliest vessels were unsuitable. At small cost, other propeller-blades of greater area have been made and fitted, with

the result that the designed speed of 23 knots has been considerably exceeded.

It is noteworthy that, at present, the construction of protected cruisers is limited to vessels of small dimensions, and that there is a free use of armour on the sides and decks of battleships and first-class cruisers. Under these circumstances it is interesting to remember that about 18 years ago, in Parliamentary debates, high authorities expressed the opinion that the days of armoured ships were near an end, and that swift protected ships would be used instead. These utterances occurred almost immediately before the introduction of high explosives, and the larger natures of quick-firing guns, as well as the remarkable series of improvements in armour and projectiles, fundamentally altered the conditions of warship design. He is a bold man who ventures to predict what may happen in this department of construction. "One step" is here "enough" for most persons who have to undertake responsibility. Irresponsible critics manifest no doubt or hesitation in statements of policy or suggestions for programmes of construction. Those who have to take the responsibility for decision in regard to naval affairs, both in this country and abroad, are too well-informed to be influenced by hasty or incomplete reviews of the situation of affairs, and the lines on which advance must be made.

Relative importance of deck and side armour.

The subject of the relative importance of deck protection has been touched upon, but it seems desirable to call attention to some considerations which are hardly appreciated even by writers who have given great attention to this matter, and whose opinions command respect. Amongst these may be included the author of the able articles on "Armour and Ordnance" which have appeared in recent issues of the *Naval Annual*. It is too much the fashion to treat the subject of armour protection from the point of view of *smooth-water* fighting. Much is made of the fact that, in the Mediterranean, battleships rarely roll heavily; but a small experience of Mediterranean weather suffices to prove that circumstances may occur in that sea producing considerable rolling in the largest battleships. Mail steamers of the largest size often have to reduce speed in the Mediterranean because of heavy weather. Nor must it be overlooked that the British Fleet can never be designed for exclusive service in the Mediterranean, but must be equally available in the Atlantic, or in other seas where smooth water is the exception. These are mere truisms, but they need to be repeated, as they are often overlooked. Let it be assumed, however, that a very moderate roll takes place, say only 10° on each side of the vertical. Further, let it be assumed that, under modern conditions,

the flight of projectiles is practically horizontal, within the ranges that need to be considered. Let us take a modern battleship of, say, 75 ft. beam and 400 ft. in length. The total deck area in such a ship is over 22,000 square feet. A roll of 10° involves the exposure to attack, by the projectiles of an enemy, of a deck-target which has an obliquity of 10° to the horizontal flight of the projectile, and which on the full width of the ship has a projected height of about 13 ft. If the vessel in question was a British first-class ironclad the vertical height of the side-armour above water when the ship is upright and at rest in still water is about 9½ ft. Consequently, under the assumed conditions, the deck target resulting from the moderate roll of 10° exposes to attack a vertical (projected) height of target exceeding by 3½ ft. (nearly 40 per cent.) that of the side armour when the ship is upright.

Débris decks.

We have exact information of what such a deck target is capable of bearing, when attacked by ordinary projectiles or by high-explosive shells; and it is known that very serious damage will be inflicted unless adequate strength is given to the deck plating. Large fragments of the deck plating and supports must be blown down by the impact of large projectiles with powerful bursting charges. It is therefore necessary to do two things. First to make the exposed protective deck at the top of the vertical armour of sufficient strength. Secondly, to reinforce this deck by another protective deck, curved down at the edges to meet the lower edge of armour, and made capable of stopping *débris* and fragments from the upper protective deck. This idea of a *débris* deck is a very old one; it originated with the French; but in many cases the *débris* deck has been either placed too close to the upper protective deck, or else so rigidly connected thereto, that injury to the upper protective deck would almost inevitably have involved serious damage to the lower or *débris* deck. These were the considerations which led me, from the time of the design of the Canopus class in 1896 onwards, to recommend to the Admiralty a new arrangement of protective decks both for battleships and for armoured cruisers. Persons familiar with the designs of battleships are aware of the very considerable weights which have to be assigned to steel plating on protective decks in relation to the weights assigned to hull armour. It will be seen that, if the vertical wall of armour on the side of a battleship is, say, 15 ft. deep and her extreme breadth is 75 ft., the same weight will be required for a steel deck 1 in. thick as would provide side-armour 5 in. thick. In a modern British battleship of the first-class, considerably more than 25 per cent. of the total weight of protective material is worked into deck-

armour; whereas in many foreign designs the weight assigned to deck-armour is proportionately much less, and the vertical armour is strengthened by accepting much weaker protective decks. This, in my judgment, is a serious defect in design, and our practice is worthy of continuance, although it involves more weight and larger ships. Tabulated comparisons ignore this fundamental difference.

Moreover, for reasons stated above, it is in the highest degree important that the stronger of the two protective decks should be situated at the upper edge of the side armour. High explosive common shells with large bursters must obviously burst on impact on the upper deck. The lower protective deck is situated so far below the main deck that there is little risk of serious injury to the lower deck from fragments of plating or projectiles. In our latest armoured vessels the vertical side armour is carried forward to the bow, and the transverse armoured bulkheads at the fore ends of the citadels are abolished. The upper protective deck then becomes of even greater importance to the defence of the bases of the barbettes, and to that of the vitals placed below it in the holds—engines, boilers, magazines, etc. Further, in discussing this matter, it is important to remember that when a vessel is either chasing or being chased the great longitudinal extent of the deck target, and the slow change in relative position of the ships engaged, tend to greatly increase the risk of injury to decks by gun fire. On many previous occasions I have drawn attention to the fact that defence in modern warships is always at a disadvantage as compared with offence. Defence by armour forms an essential part of a design, and is practically fixed and unalterable; whereas the attack can be varied and possesses great flexibility. Given a certain quality and thickness of armour, and assuming an attack by guns whose penetrating power is superior to the defensive power of much of the armour, then clearly it is not impossible, and usually it is not difficult, to so vary the character of projectiles and the weights of bursting charges so as to produce increased destructive effects. Difficulties have occurred no doubt in the designs of projectiles and fuses with high explosive charges; great improvements have been made also in recent years with armour manufacture; but in the end it is certain that the attack will gain upon the defence, because of its greater possible modification. Artillerists anticipate that large explosive charges will be carried through armour, and made to take effect within ships. This outlook furnishes sufficient reason for fitting substantial plating on lower protective decks. But obviously there can be no comparison between the destructive effect possible when projectiles have only passed through the light steel sides of a ship, and the corresponding damage

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produced by projectiles which have been modified so as to carry smaller charges through armour of considerable thickness. Recent designs of ships, with their more extended armoured areas and stronger protective decks, have well matched the farthest advances in artillery and explosives. To reduce deck armour is not a change that can be justified.

Horizontal armour is now ordinarily fitted on the decks forming crowns to batteries, and is necessary to complete the protection of guns, crews and ammunition. Being placed high above water, it is usually much thinner than the protective plating on main decks; but it is unquestionable that in a ship rolling through very moderate angles there must be great risks of penetration of these crowns to batteries and of serious damage to the secondary armament. One result of the adoption of the battery system is that these crowns have large areas and offer large targets, while injury at any point is likely to produce widespread damage in the enclosed space. The corresponding risks with isolated casemates or turrets are obviously much smaller, and this feature is not unimportant, although it is of a secondary character in the defence.

Latest stage of contest between guns and armour.

We are now witnessing the development of another chapter in the never-ending struggle between guns and armour, and in a broad sense are seeing a repetition of history.

The principal armaments of battleships are now almost universally formed by 12-in. guns. Their secondary armaments are being reinforced by 7½-in., 8-in., 9·2-in. and, in the latest Japanese battleships, 10-in. guns.

Improvements in gun mountings and in mechanical appliances for the operation of the breech, as well as changes in the arrangements for loading heavy guns, have enabled much more rapid rates of fire to be obtained. Protection of the secondary armaments has been strengthened by the use of modern armour of superior quality and greater thickness. These changes have led to the relative degradation of 6-in. quick-firing guns, or to their entire supersession. As one who has witnessed many experiments with guns and armour, and has carefully studied the results, I would express the opinion that notwithstanding all that has been achieved in the direction of rapid loading for heavier guns, 6-in. guns still retain great value as items in the secondary armaments of battleships and large armoured cruisers. More especially does this appear true when it is remembered that the tendency to adopt batteries for secondary armaments and to give large horizontal training to guns, inevitably carries with it the necessity for gun ports which necessarily form points of weakness in the defence. The presence of 7-in. or thicker armour between these

points of weakness in no sense increases the strength at the gun ports, although it is undoubtedly important as an element in defence. Against batteries, therefore, the 6-in. gun still remains a valuable weapon, and against turrets it may be effective in producing "jamming" or obstruction. Nor should it be forgotten that the 6-in. gun is, in a certain sense, the largest possible "true quick-firer," having projectiles which can be "man-handled," and being capable of rapid training and evolution by manual power alone. The 7½-in., 9·2-in., and 10-in. gun all require the provision of mechanical power for working and loading them rapidly. With the utmost care and skill in its device and maintenance, the entire avoidance of accidental injury or breakdown to such gear is impossible. When it occurs manual power can only be applied in a slow and unsatisfactory manner, so that fighting efficiency is impaired. Not unfrequently it happens too that the defence of guns above 6 in. in calibre is not reasonably proportioned to their ballistic characteristics. To mount 9·2-in. guns with only 6-in. protection, or to adopt 10-in. guns with the same defence, is not a reasonable arrangement. By general agreement hitherto the thickness of armour-protection given to guns has borne a fair relation to their penetrative power, and sufficient reasons for abandoning this principle have not been shown. In short, the practice of using thin armour for protection to guns of high power and great weight grows out of the desire to keep down the weight of armour, and sacrifices defence to an increased power of offence.

Another matter of importance is the desirability of mounting these more powerful and much longer guns at considerable heights above-water, in order that their more efficient use in a seaway may be secured. I do not propose to dwell on or illustrate this point, but it must greatly influence designs in the immediate future, and affect the distribution of armour.

Under-water armour. The small depth below water to which armour plating is carried in all classes of warships is a feature which has been so long accepted, that its full bearing upon the question of armour protection is apt to be left unnoted. Taking again the case of a typical first-class battleship of 75 feet beam, if the armour belt extends six feet below water an angle of inclination of less than 10° in still water would emerge the unarmoured portion of the bottom. If the coals were consumed and other stores or ammunition expended, of course, a less angle of inclination would produce the same result in still water. When a vessel is moving at speed in still water, the wave-profile along her sides, at certain portions of the length, considerably lowers the water level, and so diminishes the depth of the armour below the surface; even exposing the unarmoured bottom at certain points. In a

seaway a very moderate rise and fall of the wave-surface exposes many portions of the unarmoured bottom; and rolling or pitching of moderate amount may produce greater exposure. Here again there is no difference of opinion as to the facts, but a very frequent forgetfulness of what the facts involve. It is generally assumed that projectiles which do not impinge upon the hull of the ship because their range is a little short can have little or no chance of penetrating below water and reaching unarmoured portions of the hull. Long ago it was proposed to use "flat-headed" projectiles for this purpose, but the objections to that form of head were obvious, and no practical effect has been given to the proposal. As remarked above there is nothing more difficult than to obtain the exact range required in order that a vessel may be struck at, or very close to, the waterline, and this is especially true in the long-distance firing which now finds favour; but it is interesting to note that in the action at Port Arthur the Japanese are said to have made most excellent practice against the Russian ships and to have seriously damaged some of them at or below the water-line. The increasing use of range-finders of a trustworthy character may have had something to do with this result: and it is known that the Japanese were well equipped in this respect; but other means may have been taken in this special case for accurately determining the range against ships which were at anchor and in fixed relation to well-known positions on shore. However this may be, enough has been said to show that it would be folly to regard the unarmoured portions of the bottoms of ships as safe from all attack of gun-fire. At the same time that risk is hardly worth mentioning when compared with the dangers resulting from under-water attack by torpedoes, of which the speed, effective range and maintenance of course have been so remarkably developed in recent years.

There have been many proposals to extend the use of armour plating to the submerged portions of ships, more especially as a protection against torpedoes. Experiments have shown that, if fitted on the outer bottom, armour is ineffective against the explosion of large charges of explosives in contact with, or very near to, the ships. As a result it has been suggested to fit armoured inner bottoms (or wing bulkheads) at a few feet inside the outer skins, which were to be formed as usual of thin steel plating. Sir Edward Reed has patented arrangements of this nature, and Russian designers are reported to have constructed armoured "wing" bulkheads in their latest battleships. The Borodino class are said to have vertical and longitudinal armour bulkheads 4-in. thick in wake of engines and boilers, extending from the armoured deck down

to the turn of the bilge (about twenty-three feet below water) and placed about five to six feet from the outer skin, and 4-in. armour on the outer bottom. The latter item seems doubtful. In the Cesarevitch it is stated that there are armoured wing bulkheads, but ordinary outer skins. This ship is one of those attacked by the Japanese torpedo flotilla at Port Arthur and very seriously damaged. As yet our information is incomplete, but so far as is known the armour protection to the under-water portions of the Cesarevitch have been altogether ineffective, and she has been put out of action as completely as her companion ship, the Retvisan, which was constructed in the ordinary manner. Personally, I have been always opposed to this application of under-water armour, chiefly because it appeared probable that, even with external armour fitted at some distance from the outer bottom, the effect of the explosion of a modern torpedo would produce such serious shocks and jars upon the armoured inner bottom or bulkhead and its fastenings, that leakage into the interior would result even if the armour itself was not perforated or driven in. So far as can be judged from accounts hitherto available, this form of injury really proved fatal to the Cesarevitch, for it would seem that she was kept afloat for a considerable time by her pumps, and this suggests that the leakage which occurred was through openings having a small aggregate area such as would result from "jarring" of the rivets and fastenings, rather than from any large holes in the water-tight portions of the structure, through which water would pour in large quantities and overpower the pumps.

Another serious danger from the use of external armour, supposing that this material did its work and maintained its integrity, obviously arises from the "water-logging" of spaces outside the armour protection, but within the ship; which water-logging would inevitably result in serious heeling or possibly in absolute instability. Calculations made for typical vessels protected in the manner suggested, have shown conclusively that this danger from water-logging is real and great. On the whole, therefore, my opinion remains unchanged, and, in my judgment, the use of under-water armour as a protection against torpedoes is not to be recommended. Torpedo attacks have no doubt been greatly developed in recent years, by improvements in the speed and increase in the charges of locomotive torpedoes, and it may be anticipated that the school of writers who take exception to the construction of large and costly battleships or armoured cruisers will be disposed to point to recent events at Port Arthur as additional proofs of the soundness of their contention that it is unwise to "put too many eggs into one basket."

Before the incidents at Port Arthur, the same opinions were expressed, in consequence of the results of the experiments on the Belleisle, which was sunk by a torpedo explosion. To quote words used by me in my recent address at the Civil Engineers': "History is thus repeating itself, as it is apt to do. It appears to be forgotten that many years ago ships were similarly sunk by torpedoes and the same arguments used. Of course, it is necessary, in view of improvements in torpedoes, carefully to consider how the defence may be strengthened, and this is doubtless being attended to. My own conviction is, however, that these improvements in torpedoes are matched by the advances made in rapidity, range and accuracy in gun-fire, and in projectiles and 'bursters.' So that relatively the gun and the torpedo stand much in the same relation as before. In these and in all questions of war-ship design it is necessary to take a broad and comprehensive view, not to narrow the discussion to a single feature of offence or defence."

W. H. White.

CHAPTER VI.

MARINE ENGINEERING.

DURING the past year the attention of naval engineers has been chiefly devoted to a consideration of the prospects of the steam turbine as a means for ship propulsion. In the last issue of the *Naval Annual* we gave an illustrated description of Parsons' turbine, referring to the vessels already built or in progress that have been fitted with this type of motor. Engineers are still waiting for further developments in practical work, but since we last wrote on the subject it has been decided to place the Parsons turbine in vessels of the ocean liner type. The proprietors of the Allan line have ordered from Messrs. Workman, Clark & Co., of Belfast, a vessel for the Liverpool-Canadian mail service, and this will be the largest ship of the fleet, as well as the fastest. Her length will be 500 ft. over all, and she will have a gross tonnage of about 12,000 tons. The turbines are designed to develop about 10,000 I.H.P. and a speed of 17 knots is guaranteed. A sister ship is also on order. Later still, since the above was written, it has been announced that the steam turbine is to be used for the propulsive machinery of two new Cunard liners which are about to be built. These vessels will probably be the largest and fastest ships ever built. Parsons turbine.

During the past year the Parsons turbine has received further practical application in cross-Channel steamers. The first of these was the Queen, which made her trial in July last between Dover and Calais. This vessel is 310 ft. long and 40 ft. wide. On her trial trip on the Clyde she made a mean speed of 21·76 knots, whilst later, in the Channel, when running from Folkestone to Dover, she is reported to have somewhat exceeded this rate of steaming, reaching to very nearly 22 knots. Her horse-power is said to have been estimated at about 8000 indicated. There are three shafts, each with a single propeller, experience having shown that this is a better arrangement in regard to speed, vibration, and facility of manœuvring than the earlier practice of having more than one propeller on a single shaft. The revolutions were from 500 to 550 per minute. In order to go astern there are two reverse turbines fitted, one on each side shaft, the speed reversed being 13 knots. The chairman of the In Channel steamers.

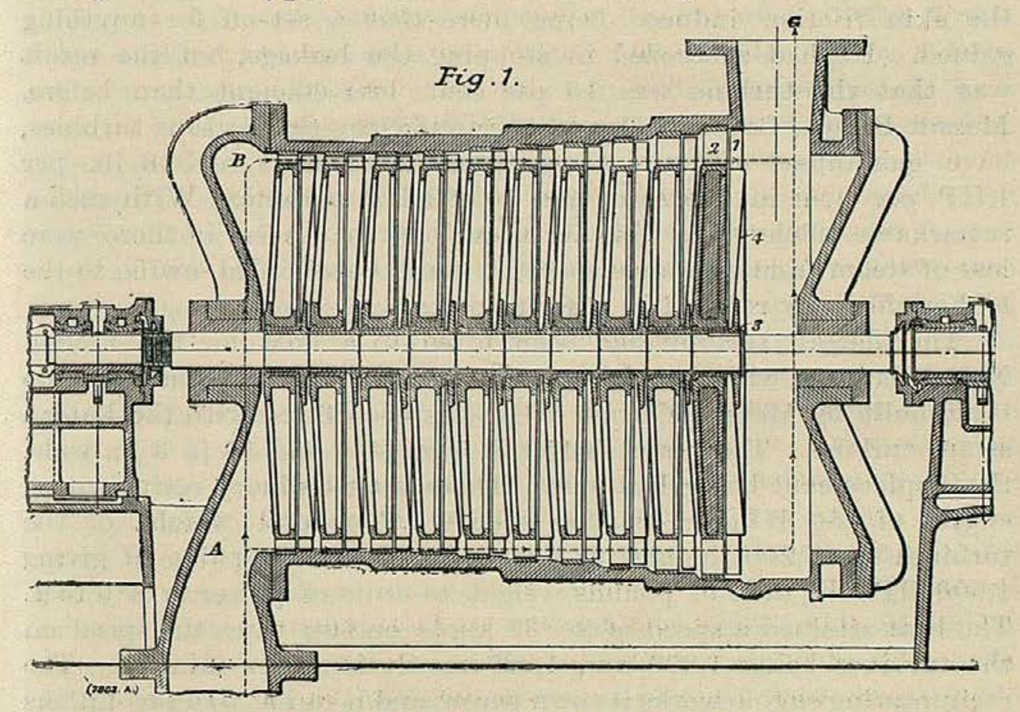
South Eastern Railway Company (who own this vessel) has stated that although she makes the passage from Dover to Calais in nine minutes less than any of the previously existing boats she only burns the same amount of coal, and has four less men in the engine-room. The consumption of oil is also said to be "infinitesimal." On a trip across Channel we made with this boat the quietness with which the main engines ran was absolute, but aft there was an unpleasant vibration from the propellers, possibly due to imperfect balance. Another Channel steamer, constructed by the same builders, and also engined by the Parsons company, which has been put in service during the past year is the Brighton, owned by the London, Brighton and South Coast Railway Company. She is 280 ft. long and 34 ft. wide, and was built for the service between Newhaven and Dieppe. This vessel has engines which are estimated at 7000 HP., and her speed is said to be about 20 knots on a long trip. The Midland Railway Company have also ordered two turbine steamers, one of which will be built by Messrs. Vickers, Sons & Maxim, and the other by Messrs. W. Denny & Brothers.

Other types of steam turbines.

In the meantime other types of steam turbine for marine purposes have been brought forward. At the Engineering Conference held in June last in London by the Institution of Civil Engineers, Professor Rateau, of Paris, read a paper, in the shipbuilding section, in which he described the turbine which bears his name. He claims that, for the purpose of electric installation, for driving ventilators, and for centrifugal pumps, steam turbines are superior to the reciprocating engine; and he states that he is prepared to instal plants of several thousand horse-power for compressing air or raising water. This, he considers, shows that the steam turbine possesses vast possibilities; the latter a fact which probably no one will be inclined to dispute. In Fig. 1 is given a sectional view of the Rateau turbine. It consists of a series of rotating wheels keyed on the turbine shaft, and separated by circumferential diaphragms held in grooves inside the turbine casing. The wheels consist of buckled steel plates of conical shape, and on the periphery of these are riveted nickel steel blades, which are further held in place by a band. The fixed blades of the "distributors" (guide blades) are fitted on the periphery of the diaphragm opposite the wheels. The shape of the steel plates forming the wheels is shown at the number 4 in Fig. 1, whilst one of the guide blades is indicated by the number 2. In the drawings the last diaphragm is hatched, in order to indicate the construction more clearly. The shaft runs through the diaphragms in bushes of anti-friction metal, and has but little play, originally not more than two tenths of a millimetre. Any leakage of steam outside the dis-

tributor can only take place through this small space. The distance between the wheels and the fixed parts is from three to six millimetres, and there is, therefore, no fear of them coming into contact. The blades can be easily removed and replaced. The course of the steam is through the diaphragms and the wheels, from the inlet marked A and B in Fig. 1 to the exhaust passage G. The steam pressure decreases progressively, each wheel working under a low fall in pressure. The number of wheels varies, in different machines, from three or four only up to thirty or forty.

The Rateau turbine is described by its inventor as being of the multiple action type, in which the steam only acts on the movable Rateau turbine.



wheels by its velocity, and each wheel revolves in a casing in which the pressure is uniform. For this reason the steam does not produce any sensible longitudinal thrust on the moving parts, so that no special provision to neutralise such thrust is needed. Neither does the steam tend to rush across the blades in order to pass from one face to the other, and it is therefore possible to provide sensible clearance between the moving and fixed parts. It is also claimed that, under the same conditions, action turbines revolve at a less velocity than reaction turbines. The chief advantage of this form appears to be that, there being no difference of pressure in the chambers there is no tendency for the steam to escape at the clearance space. There would, however, be a fall in pressure as the steam

passed through the diaphragms. It may be pointed out that for a turbine for marine propulsion to have no thrust is not necessarily a virtue. In the reaction turbine the thrust of the propeller may be balanced by that of the steam, so that the ordinary thrust block of the marine engine is not needed. In regard to loss of efficiency by the escape of steam at the clearance spaces, it may be pointed out that the Parsons turbine has not been recommended by its makers for small sizes, where the ratio of clearance would, naturally, be greater than with larger engines. Mr. Parsons has stated that every possible device has been tried to get over the loss of steam through clearance, but the endeavour has always ended in disappointment, the skin friction induced being more that a set-off for anything gained. He had succeeded in stopping the leakage, but the result was that the turbine was 15 per cent. less efficient than before. Messrs. Brown, Boveri & Co., who manufacture the Parsons turbines, have guaranteed a steam consumption equivalent to 8·8 lb. per I.HP. per hour in the case of a 10,000 HP. turbine. With such a remarkable efficiency as this it is evident that, even if there were loss of steam from clearance space, it could be afforded, owing to the higher efficiency reached in other respects.

In Yarrow torpedo boat.

The Rateau turbine has been fitted to a boat for the French Navy, but not with very successful results. A first-class torpedo boat, built by Messrs. Yarrow & Co., has been fitted with the Rateau steam turbine. The vessel is 152 ft. 6 in. long and 15 ft. 3 in. wide, the displacement being 140 tons. There is an ordinary reciprocating engine of 250 HP. for cruising speeds. The total weight of the turbines is 17,200 lb., and as they are said to be capable of giving 2,000 HP., the ratio of pounds weight to units of power is 8·6 to 1. The boat attained a speed of 26·39 knots on two runs, the speed on the turbines being 1,258 and 1,307 revolutions per minute. The reciprocating engine works its own screw, and it ran at 576 revolutions per minute during this full-power trial. With the reciprocating engine alone working—no steam being supplied to the turbines—the speed was just on 12 knots. The boat was fitted with Yarrow boilers. It would be extremely interesting to have particulars of these, and the extent to which they were forced, in order that an estimate might be formed as to how far the success of the trial was due to this remarkably efficient type of boiler, which is so admirably designed to bear forcing to its fullest extent.

The expiration of the Parsons patent has led other engineering firms to turn their attention to the steam turbine. The British Westinghouse Company, Messrs. Willans & Robinson, Messrs. Richardsons, Westgarth & Co., and others, are entering the field.

Mr. Ferranti has also been engaged upon the invention of a new type of turbine. On the whole it would appear that we may look for some notable developments in the design and construction of steam turbines within the immediate future.

Mr. C. G. Curtis has been working in this direction, and his ideas have been taken up by the General Electric Company of Schenectady, who are prepared to supply compound turbines of very large size and with high efficiency. The Curtis turbine is also manufactured by the British Thomson-Houston Company, of Rugby. An example is illustrated in *Engineering* of February 5th, 1904. It is of the vertical type, and therefore not suitable for the propulsion of vessels, being designed for driving a dynamo direct. The Curtis steam turbine has, however, been fitted into the Revolution, a large American yacht, and this vessel has been officially reported on by a board of United States officers. We have, therefore, some particulars of her performance, which it may be of interest to add, as these are the first set of steam turbines installed for steam propulsion in the United States. The turbines of the yacht are estimated by Professor Denton to give 1800 I.HP. at a speed of 672 revolutions per minute; the steam consumption equalling 18·14 lb. per I.HP. per hour. This, however, is believed to be an excessive consumption, as the steam was only used in two stages, and it is estimated that with four-stage turbines the consumption of steam would be reduced "well within the margin of prevailing averages for marine engines." Each turbine actuated one screw of about 4 ft. 6 in. diameter and 3 ft. 4 in. pitch. Curtis turbine.

The condensers were of the ordinary type, fitted with a bottom scoop injection, assisted by a small circulating pump. A vacuum of 28 in. was maintained without trouble. Steam was generated in two Seabury double-ended water-tube boilers with 94 sq. ft. of grate surface, and arranged for operating under forced draught. Steam entered the turbine at a pressure of 250 lb. to the square inch through four steam nozzles (each of which supplied a quarter of the full power of the turbine), and acted consecutively upon a series of bucket wheels constituting the first stage of expansion. The pressure was carried in this stage from 265 lb. absolute to about 16 lb. absolute. The steam then flowed through four other nozzles and acted upon another set of bucket wheels, forming the second stage, the expansion in which was from 16 lb. absolute to less than 1 lb. absolute. Reversing was effected by vanes on the outer rim, arranged in an opposite way to the ahead vanes, and inclosed in the casing of the secondary stage, a separate steam-pipe leading to this part of the casing.

The Report speaks of "the general ease with which the machines

in question are cared for and handled"; and attributes this to "the great simplicity of the mechanism when compared with the reciprocating engine." "As an engine," it is said, "it requires but little previous warming up; there are no cylinder drains to be opened, nor any need for filling up of oil boxes, or feeds, and wick cups; the turning on or the shutting off of the main steam supply being the principal and almost the only operation remaining." These points are, of course, not peculiar to the Curtis type of turbine. The space occupied was not less, but perhaps a little more—in the opinion of the naval officers who formed the board—than that required by the engines of the torpedo-boat class. This, however, was not considered to be a matter of importance, as the small amount of overhauling needed allowed of the space being well spared. The weight of the turbines proper was given at 8¾ lb. per equivalent indicated horsepower, and was thus less than that of torpedo-boat engines, the latter being given as 11½ lb. per I.H.P. It was also stated in the Report that the turbines in question had not been taken apart since they were first erected one-and-a-half years previously. It will be seen that the Report, as far as it goes, is of quite a satisfactory nature; and further developments with this turbine will be watched with interest.

Turbines in German Navy.

During the past year steps have been taken to introduce the Parsons steam turbine into the German Navy. The Turbinia Company of Berlin — the German Parsons Marine Company — has received two orders, one from Messrs. Schichau, of Elbing, for five turbines to be fitted in torpedo craft; and the other from the Vulcan Company, of Stettin, for six turbines for the cruiser Merkur. These will be the first ships of the German Navy in which reciprocating engines have been supplanted by steam turbines. In both cases steam will be supplied by water-tube boilers at over 200 lb. pressure. The torpedo boat installation is for 5000 HP., and two of the five turbines are to be used for cruising speeds. There will be three shafts, each of which will operate two propellers, and make about 700 to 800 revolutions per minute. The speed anticipated with the torpedo boat is about 27 knots. The cruiser's machinery will develop 10,000 HP., two of the six turbines being for cruising speeds. At 22 knots the revolutions will be 650 per minute. It is noticed as an advantageous feature with this type of machinery that the entire plant will be well below the protective deck.

The internal combustion engine.

About twenty-five to thirty years ago, at a meeting of the British Association at York, an eminent and remarkably sound engineer, the late Sir Frederick Bramwell, ventured on the prophecy that in fifty years the steam-engine would only be seen in museums of

antiquities. When about fifteen or sixteen years later the writer of this chapter made a short trip on the Thames in a small launch driven by engines of altogether novel construction, he well remembers wondering at the time whether Sir Frederick Bramwell's prophecy might be fulfilled more quickly than he anticipated, and that this might possibly prove the forerunner of a vast change in methods of marine propulsion. The boat in question was about thirty feet long, and it was driven by a two-cylinder internal combustion engine, the fuel for which was ordinary paraffin oil. She was not fast compared with an ordinary steam launch; her engines were noisy, gave forth a pungent and unpleasant odour, and altogether they formed, as they stood, a most undesirable type of marine motor. That, however, was but a beginning, and engineers who knew the inefficiency inherent in the design of the steam boiler and engine were able to recognise that here might be the germ of something altogether more effective.

Boiler losses.

The losses due to using steam as a source of power are well known. Before water can be evaporated, there is a large amount of heat that becomes latent. The waste of heat at the chimney is also a defect that cannot be overcome, whilst in the engine itself no means have yet been discovered for altogether doing away with the many defects and losses due to the use of steam. These and other causes result in from 85 to 90 per cent. of the theoretical value of the fuel being lost; that is to say, for every 100 lb. of coal burnt the heat energy of about 15 lb. alone appears as useful work at the best. If we remove the generation of heat from the boiler furnace to the engine cylinder we have a set of conditions affording vastly increased possibilities of efficiency. But, unfortunately, here again practical considerations step in and prevent anything like the theoretical maximum being reached. The heat generated by the combustion of gases in the engine cylinder is so intense that the mechanism would be rapidly destroyed were not means taken to lower the temperature and thus extract some of the heat without doing useful work. In all but the smallest sizes of motors the cylinder has, therefore, to be surrounded by a water jacket, and the heat thus carried to waste goes far to neutralise the other advantages of the system. When all allowances are made, however, the gas engine has proved itself a rival to even the best steam engines in regard to economy; and, naturally, if one can do away with the cumbersome and heavy boiler an enormous advantage is gained. In small vessels this has been effected, the fuel used being gasolene, petrol, or some other light oil or spirit; and the weights of propelling machinery have been greatly reduced, as compared to that fitted in the swiftest kind of craft, such as torpedo boats and destroyers, even when turbo driven. In the Turbinia over

2000 I.HP. (estimated) was obtained for 22 tons of machinery. This would be equal to 24·64 lb. of machinery per I.HP. Mr. Linton Hope, who designed the Napier motor-boat—which attained such remarkable speed last year in the motor-boat races—has worked out another design in which the weight of machinery is less than 10 lb. per I.HP. This is, of course, a case of extreme lightness, and for more serviceable craft, not designed merely with a view to speed, the figures in both cases would be of a different character; the power developed being smaller in terms of the weight of machinery. It does not, however, need a comparison of figures to convince one how much can be gained by doing away with the steam boiler.

Sir William White on the gas engine.

When, however, we come down to practical details for ordinary work, we soon find what an immense distance will have to be travelled before the internal combustion engine competes with the steam engine afloat. Sir William White, in referring to this subject in his address of last year, as President of the Institution of Civil Engineers, said that "the progress made in recent years with gas engines of increasing power naturally raises the question whether they may not take the place of steam engines even in large ships. No one can fail to be attracted by the prospect of possibly dispensing with the use of steam as an intermediary, and directly using gas for internal combustion engines. Of course, in sea-going ships, questions of importance arise as to the power of covering long distances, and the arrangements for generating or storing gas as well as obtaining adequate supplies of coal or oil. We are on the threshold of this subject, and it seems probable that a great deal more must be done on land in the development and use of gas engines of very much greater power than any yet constructed before the steam boiler disappears from ships."

This passage is quoted not only for the purpose of showing what is in the mind of those of the highest position who are engaged in the science of ship design, but also as an apology for introducing what, to some perhaps, will appear quite a visionary subject. It is well to remember, however, as has been recently said, that the impossibilities of yesterday become the commonplaces of to-morrow. However the orthodox marine engineer may be inclined to scoff at the idea of gas engines on a battleship or an Atlantic liner, the anticipation is, perhaps, not more grotesque than was the suggestion of superseding sails by steam-power as it appeared to naval officers of not very many years ago. The internal combustion engine using pulverized coal is yet undeveloped; as it is likely to remain for very many years to come, although a large example was shown—not necessarily at work—at the Glasgow Exhibition. For oil engines of large powers the

question of cost is an insuperable barrier. To use ordinary burning oil as fuel is as yet outside the bounds of possibility, or at any rate, desirability; although rapid improvements are being made in this direction. For the lighter constituents—petrol, gasolene, etc.—the price is prohibitive, and there is not much prospect of improvement in this respect, as the natural supplies are extremely limited. These considerations for the present eliminate the oil engine from the field of practical utility for large powers, though it offers great promise for torpedo craft, ships' cutters, pinnaces, etc. There remains, then, the gas engine to consider. To instal gas producers, using coal or coke as fuel, on board a ship is certainly a bold suggestion, but perhaps not more so than the introduction of the steam boiler appeared in earlier days.

It is, indeed, in the engine, and not in the apparatus for generating motive fluid, that the difficulty rests. At the present time nearly all large gas engines work on what is known as the "Otto" cycle, which is founded on that of Beau de Rochas. This gives but one working stroke from each cylinder out of every four strokes, or two revolutions. The cycle is as follows: The explosive mixture having been introduced into the cylinder and compressed, an impulse is given to the piston on the working stroke by the explosion of the gaseous mixture; the next stroke clears the cylinder of the burnt gases. The third stroke, which is a forward stroke, sucks in a fresh charge of combustible mixture; and on the fourth stroke again this receives the compression that is needful to make it explosive. Under these circumstances with a single cylinder engine three strokes, or one and a half revolutions, have to be carried on by the energy stored up in the flywheel, and this is why such large flywheels are needed. The ordinary gas engine, it will be seen, unlike the ordinary steam engine, is single-acting. The cylinder of the gas engine only does a quarter of the work that would be done by the cylinder of the steam engine; and it will be easily understood how this, in conjunction with the heavy flywheel and the greater strength of all working parts, will add to the weight of the gas engine as compared to steam engines. "Otto" cycle.

Efforts have been made to render the power exerted by the gas engine more continuous, notably by compressing the explosive mixture in a pump separate from the cylinder. This device, however, has not been found to be generally satisfactory; in fact, it is like adding another cylinder to the machine. Designs for double-acting gas engines have also been introduced, but here again difficulties arise on account of the special nature of the mechanism and the additional heating of the cylinder. In the smaller sizes of oil engines, however, a good many two-cycle motors working Two-cycle motors.

with petrol have been introduced for marine purposes. The general arrangement is to enclose the crank-chamber, placing a non-return valve in the passage from the carburettor, the apparatus in which the petrol is volatilised. A passage leads from the crank-chamber to the cylinder, and the piston when near the end of its downward stroke uncovers the entrance to this passage, so that the crank-chamber and the cylinder are put into communication. The exhaust port, for the escape of the burnt gases, is also opened by the travel of the piston. As the engine is single-acting, with an open end to the cylinder, the downward stroke of the piston has the effect of compressing the contents of the crank-chamber, consisting of air and gas, which form the explosive charge. In this way the plenum in the crank-chamber drives the charge into the cylinder, and at the same time the burnt gases of the previous charge escape from the cylinder, the exhaust passage having been opened by the movement of the piston. It will be seen that both the admission and exhaust ports are here open at one time, and a deflector plate has to be fitted in order to prevent, as far as possible, the explosive charge escaping by the exhaust port at the same time that the spent gases go out. The extent to which the action is complete governs the economy of the engine so far as waste of combustible gas is concerned. The advocates of this type of motor say that there is very little, if any, loss. So far as the writer is aware, this contention has yet to be made good by experiments of a more exhaustive nature than have yet been carried out, and made by independent authorities. The engine is, however, simple and convenient, and appears to give good practical results in small vessels.

Oil engines for submarines.

In passing from the region of anticipation to the domain of accomplished fact, there is one position in the field of naval propulsion where the oil engine has asserted itself; this is in submarine boats. In the *Naval Annual* of 1902 particulars were given of the various vessels of this class which up to that time had been introduced into the large Navies of the world. The British Admiralty had then ordered from Messrs. Vickers, Sons & Maxim five vessels of the newest type invented by Mr. J. P. Holland; and in the *Naval Annual* of the previous year a sectional profile view of the Adder and her sister submarines was given, as well as a brief description, and some particulars of other boats of this type built for foreign Governments. A photograph of the first British submarine, travelling on the surface, was also given in the *Naval Annual* of 1902.

Trials of American submarines.

During last year particulars have been published in the *Journal of the American Society of Naval Engineers* of the trials of seven Holland submarine boats of the newer type added to the United

States Navy. We are not concerned in this chapter with the relative advantages or disadvantages of submarine boats from a military point of view, excepting so far as these depend on the engineering and constructive features of the vessels. The new American boats, of which the Adder and Mocassin were the first to be tried, are 63 ft. 4 in. long, and 11 ft. 10 in. in diameter. There is a single screw, power for working which is transmitted to the propeller shaft though gearing by two methods. First, there is a four-cylinder gasolene engine of 160 H.P., each cylinder of which can be used independently of the others. There is a 70-H.P. four-pole shunt-wound electric motor, running at 880 revolutions per minute, which receives current from storage batteries having a capacity of 1900 ampère hours at the normal rate of discharge, the voltage being 115. The oil engine is incapable of being reversed, and therefore for manœuvring the electric motor alone is used.

For working on the surface the gasolene engine is employed, but when the vessel has to be sealed for submarine propulsion, the electric motor is brought into play. The boat is submerged by the use of diving rudders and the filling and trimming of the ballast tanks. In the new vessels the diving and vertical rudders are worked by hand, power being transmitted very satisfactorily through gearing, the complicated and delicate air engine for operating the horizontal and vertical rudders as installed on the Holland having been removed. Lieutenant W. R. White, U.S.N., to whom we owe the majority of these details, states that "experience has shown that more reliable and satisfactory results are secured by relying on the skill and on the intelligence of the crew, and not upon the certainty of action of presumably automatic devices which are liable to fail at critical times." A single three-bladed screw is used to propel these boats. Its efficiency is said to be low, and this is accounted for by the small size and small pitch ratio. These are features that are probably unavoidable under existing conditions, considering the high number of revolutions at which both electric motors and oil engines are most advantageously run.

Ventilation of submarines.

The means adopted for the important duty of ventilating these vessels is given by Mr. Morgan, a member of the American Society of Naval Engineers, who attended the trials of the Grampus and Pike, sister vessels to the Adder and Mocassin. There is a one-fifth horse-power motor and Root-blower placed near the engine, and a one-twelfth horse-power fan motor in the stern of the boat, and for ventilating the battery tanks there is a quarter horse-power motor. Air is supplied through the conning tower and the

torpedo-hatches from one 4-in. ventilator. The air is exhausted from the top forward end of the engine-room by a one-fifth horse-power motor and blower through a 2-in. pipe, which is said to be too small to do the work. In speaking on the question of ventilation, Mr. Morgan says that during the twelve hours' endurance trial, after about five hours' running, the air in the engine-room was noticeably bad, and became gradually very much worse. In rough weather or at sea, the torpedo-hatch and the conning tower would be closed, leaving the 4-in. ventilator as the only means of fresh air supply. With the gasolene engine in use for surface and awash runs, the ventilation system as installed was inadequate to ventilate the boat properly, a fact which was clearly emphasised by the placing of four additional electric fans in a position to blow the air up the open hatch. This temporary installation of blowers was without appreciable benefit, showing the difficulty of ventilating the boat. Any neglect or failure to keep the cylinders properly oiled would enhance this trouble, as was shown, when, after about nine hours run, the air became so bad abaft the engine-room partial bulkhead that it would not have been possible for a single crew to have kept the boat running for any length of time."

Trials of Adder.

An endurance run of twelve hours with a gasolene engine was made with the Adder, there being three stops during the trial for the following reasons: Igniter of No. 1 cylinder commenced blowing about two hours after the beginning of the run; time lost was eight minutes. In getting away from the dock the gasolene engine was disconnected, and the electric motor put in use; time occupied being 6 minutes 40 seconds. In coming alongside the dock, while changing from the gasolene engine to the electric motor, not working fast, the time lost was 17 minutes 40 seconds. It is said that at the end of this run there were no offensive odours perceptible; but we are reminded that carbonic oxide, one of the products of combustion, is odourless, but very poisonous, whilst carbonic acid is heavier than air, inert, odourless, and incapable of supporting life. It is thus possible that there may have been debilitating gases which could not be detected by the sense of smell. The Adder was run also in a submerged condition for a period of three hours, with, of course, the electric motors in use. During the first two hours and twenty minutes of this trial the average speed was estimated at 7 knots. During the last half hour it was less, owing to the storage battery running down. A torpedo was fired. The conning was done entirely by means of the periscope temporarily rigged from the forward port ventilator. For over two hours the Adder remained submerged without coming to the surface to take an

observation. During this time her average depth was about 11 ft., making the conning tower about 7½ ft. below the surface.

It is stated that when using the periscope the relative position of objects is apparent, but it is absolutely impossible to judge distances with any degree of accuracy. Cases have been known where submarines have rammed a sea wall, which, seen from the periscope, appeared to be quite distant. At one time during the three hours submerged run of the Adder the boat touched the sandy bottom at a depth of about 29 ft., and would not answer the diving rudder. It was not until the main ballast tank was blown out that she floated and rose to the surface. The result would have been serious for the submarine if the bottom had been of a clayey formation; the energy of the mass might have caused the boat partially to embed herself, when the weight of the column of water, together with the atmospheric pressure, tending to hold her to the bottom, might have been sufficient to neutralise the reserve buoyancy gained by expelling water from the ballast. The circumstance reminds us of the narrow escape from disaster that occurred to a submarine boat some years ago in Tilbury Dock. This vessel settled on the bottom —she was simply rising and sinking in the water—and it was only by the utmost exertion of the crew, directed by the late Director of Naval Construction, who was on board, that the party was rescued from its dangerous position. The periscope.

The most interesting feature during the past year in the field of boiler experiment has been the trial of the cruisers Medea and Medusa, made last November. These cruisers are sister ships, and the former has been fitted with Yarrow boilers, while the Medusa has those of the Dürr type. The vessels are propelled by twin screws, their principal dimensions being 265 ft. long, 41 ft. wide, and a mean draught of 16 ft. 6 in. The displacement is about 2800 tons. With natural draught and 5000 I.HP. the speed is estimated at 16·5 knots, whilst with 9000 HP., developed by forced draught, the speed is given at 19 knots. The coal capacity is 400 tons, which enables the vessels to travel 8000 miles at 10 knots. Both ships were built at Chatham in 1888, and their engines, which are of the triple-expansion type, were constructed by Messrs. Humphrey, Tennant & Co. These two ships, fitted with their new boilers, and working four boilers in each ship, started from Gibraltar on the morning of November 6th. The Medusa had a start of half a mile, and maintained her lead during the run. The race appears to have been a close and exciting one, but the Medea experienced the ill-fortune of a fan breaking down when she had caught up her sister vessel. Later on another mishap of the same kind occurred. This Boiler trials.

naturally led to the Medusa recovering her lead, and she ultimately gained an advantage of about 9 miles. The Medea's fans having been repaired, the distance was gradually made up, the Medusa being 5 miles ahead when 200 miles from Plymouth. The Medea gained again until not more than three-quarters of a mile separated the two ships. Ultimately the vessels rounded the Eddystone lighthouse about five minutes past twelve on Monday, the Medea being five minutes behind. Allowing for the start which the Medusa had been given, however, the Medea was the winner by three minutes, in spite of the mishaps to her fans. The *Western Morning News*, from which we take these details, states: "The only regret was that the Medea's fans should not have held out; but the fact that she was nine miles astern at 6 A.M. on Sunday, and reduced that to one mile in 12 hours, with only three fans working instead of four, indicates that in the Yarrow boiler we have a steam generator which is not surpassed by any on the market at the present time. An inspection of the boilers after the fires died down showed that they could have gone on again at once."

Water-tube boiler in United States.

During the past two or three years we have had a good deal of data regarding the use of water-tube boilers in the Royal Navy, owing to the reports of the Boiler Committee, and these have been dealt with in previous issues of the *Naval Annual*. In the issue of the *Journal* of the American Society of Naval Engineers for November, 1903, there is a paper giving the experience in America with this type of boiler. It will be remembered that the United States naval authorities were later in introducing the water-tube boiler into the American Navy than were those of other Powers. Mr. W. Ledyard Cathcart, the author of the paper to which reference has been made, refers to the defects of the cylindrical boiler for marine purposes, and the troubles that were experienced when it was desired to get the utmost power for the weight and space at command. The last of battleships in the United States Navy equipped with cylindrical boilers were those of the Wisconsin class, contracted for in 1896. All subsequent installations have been of the water-tube type, and, although the cylindrical boiler is said not to have been wholly discarded in cruising vessels, its day in that field also seems to have passed.

A list is given of the vessels in the United States Navy and their respective types of water-tube boiler. Of the Niclausse design, there are five battleships and armoured cruisers; of the Thornycroft design, there are two; whilst the Babcock & Wilcox boiler has been fitted into fourteen vessels of this class and eleven protected cruisers and gunboats. Of monitors and auxiliary vessels, the Babcock

& Wilcox boiler has been fitted into six, the Hohenstein boiler into two, and the Thornycroft boiler, the Niclausse boiler, and the Mosher boiler into one each. There are four ships that have a combined installation of water-tube and Scotch boilers. Two of them have Babcock & Wilcox boilers, one the Ward boiler, and one the Yarrow boiler. Reference is made to the fact that recent large battleships and cruisers projected or building by France, Russia, Italy, Germany, Austria, Holland, Sweden and Japan will be fitted with water-tube boilers, but in the British Navy there has been a partial reversion to the cylindrical type owing to the Report of the Boiler Committee. This policy of placing cylindrical and water-tube boilers together in a vessel has been tried, the author says, and abandoned both by the United States and Germany, and he is of opinion that it will probably be of but partial and temporary duration in Great Britain. The author, in dealing with the question of weight, points out that the naval engine of short stroke and high piston speed is necessarily not as economical as the engines of the higher class in the merchant marine. As an instance he quotes the Kaiser Wilhelm der Grosse, which at 22·79 knots develops 6·71 I.HP. per ton weight of machinery, including water. A smaller figure, based on estimated weights for the paddle steamer Georgia, at 19 knots, is 10·98 I.HP. per ton. Even excluding the weight saved by the use of water-tube boilers in a battleship, the latter for the same weight develops at least 15 per cent. more horse-power than is required from the liner. Other elements bearing on the economy, or the lack of it, in naval engines—such as ratio of cylinder areas—are also discussed. These, however, have been dealt with in previous issues of the *Naval Annual.* The combined system.

Mr. Cathcart's paper, which is of considerable length, discusses the question of water-tube versus cylindrical boilers for naval vessels very completely, and is well worth attention. In concluding his paper he states that "It seems clear that the water-tube boiler has reached a stage of development which makes the use of the cylindrical type in war vessels a grave military error, in the sacrifice of such advantages as rapidity in raising steam, forcing in emergency without detriment, swift construction and repair, and weight saving which can be utilised in added speed, armour, or armament. The cylindrical boiler has blocked progress in these paths, and its usefulness as a war instrument seems ended. As to the objections urged so often against the water-tube type with regard to complexity and sensitiveness in operation, it may be said that these conditions are relative only, and vary widely with different boilers. Even if this were not so, such objections cannot be considered as a bar to added military strength. Nelson's short and sightless smoothbores, with Mr. Cathcart's conclusions.

their excessive windage to allow for hot shot, were sometimes less complex and less difficult of operation than the massive rifles of to-day with their actuating mechanism. The leading boiler need of the present seems to be not so much further development as the thorough training of the fire-room force to meet new conditions, and to maintain the trial efficiency of the water-tube boiler in cruising duty."

The boilers of the Marietta.

As a practical comment on these remarks, we may take one more example from across the Atlantic. It will be remembered that during the war with Spain the gunboat Marietta accompanied the battleship Oregon in her memorable voyage from California to the West Indies. The great importance of the larger vessel as a unit of fighting force led to the equally brilliant performance of the Marietta, from an engineering point of view, being somewhat overlooked. This vessel was fitted with two Babcock & Wilcox boilers, which were, at the commencement of last year, about six years old, the vessel having been put in commission in November, 1897, and having been in active service ever since. From a communication by the senior engineer on the gunboat we gather that during these years of service the boilers required very little in the shape of renewals or repairs. A list of operations other than those carried out by the ship's company is given; they consist of the renewal of fire-brick, ash-pans, casing and lagging, and retubing of feedheaters. The boilers are said to be now in good condition, and everything about them in general works well. They have not received any special care, and no special precautions have been taken to ensure a supply of perfectly pure water; salt water, sufficient to bring the saturation of the boilers up to $\frac{1}{32}$, having been used. The ship has cruised at full speed many times for several days with this saturation, without any bad results, although the necessity of maintaining fresh feed was always recognised, and efforts made to secure it. No rupture of tubes or headers has taken place, nor has there been any dangerous overheating.

Probably no vessel in the United States Navy has steamed so many miles during the past five years. The Marietta's installation was one of the first of this type of boiler to be put into a war vessel, and no firemen were specially trained for the purpose. It is reported that dry steam seems to have been furnished, even under the severest conditions, and priming never occurred. When the boilers were forced at short notice, a steady water level was easily maintained, no automatic feed regulator being necessary. The tubes of the feed-water heaters, however, corroded rapidly, having to be renewed after the first two years' service of the ship. Though not a part of the boiler, the feed-heater is an auxiliary which contributed to economy in coal

consumption. It will be remembered that the boilers of the Marietta were of an early type, and that improvements have since been introduced. The experience gained with this vessel, however, is sufficient to show that when properly constructed and properly cared for water-tube boilers are trustworthy and efficient steam generators for naval vessels.

Recent naval operations, more especially the Spanish-American war, have shown the need for floating workships, and the Admiralty have lately initiated a somewhat new departure in connection with this matter. The old battleships Bellerophon and Téméraire have been entirely refitted by Palmer's Shipbuilding and Engineering Company of Jarrow. The Bellerophon has been almost completely gutted; a galvanised iron and glass roof has been erected above the hull, thus forming a spacious and well lighted hall. She will, with the Téméraire (which will now have to abandon her old name) and Indus, be moored at Devonport, and will serve as an instructional factory and barracks for training engine-room artificers.

The floating workshops for engineering training.

At the present time artificers are entered from private trades between the ages of twenty-one and twenty-eight. They are required to show a certificate that they have worked at the trade of fitter and turner, boiler-maker, engine-smith, or coppersmith, and they have to pass some examination. Also pattern-makers and moulders are entered for the floating factories. As is well known, there has been difficulty for some time past in getting competent men, and the Board of Admiralty have determined to enter lads who will be trained in the service in a way similar to that existing for the executive department. The upper deck of the Bellerophon, which forms the machinery hall, has been fitted with a large number of machine tools of all descriptions, whilst the Téméraire will serve as an electric generating station. The electric lighting sets for the Téméraire, the engines of which have been supplied by Peter Brotherhood, are worthy of notice as being by far the largest yet fitted in the Navy, although Mr. Brotherhood is at the present time making a considerable number of engines of the same power for the first-class cruisers now under construction. These engines are of the enclosed type, with forced lubrication, a particular feature about them being the very close governing. The dynamos are supplied by the Electrical Department of the Thames Iron Works. They will develop 106 kw., which is about double the power of sets up to now fitted on board ships of the Navy. The Indus will be a floating factory for the engineer artificers who are employed in keeping the fleet reserve in repair. It is proposed, we believe, to make these three vessels a composite unit partly for instruction, and partly for keeping the ships in the reserve

in proper order. The scheme, naturally, will have a great influence on the engineering *personnel* of the Royal Navy, and from that point of view is of interest in this section of the *Naval Annual*.

The utility of the floating workshop is also being recognised outside the Royal Navy, and lately Messrs. Swan & Hunter, of Wallsend, constructed a very complete factory of this nature, to the order of the Natal Government, for Durban. Here also the whole installation will be driven by electric power; but the Durban workshop differs from the Government vessels which we have just described in the fact that it will be provided with powerful engines so that it can steam with great rapidity to distant cases of emergency.

Naval engineering laboratory.

The problem of engineering education in the Navy has assumed an entirely different aspect through the change made by the Board in regard to the *personnel* of naval officers, and the frank recognition that the modern navy is an engineering feature. The United States Navy made this change some time ago, and recently have taken a still further step in the same direction by the decision of the government to spend a large sum of money—over £80,000—on the building and equipment of a naval engineering laboratory. As is well known, we have in this country a large and very completely equipped experimental establishment at Haslar, where investigations are carried out, by means of the experimental tank, on the technical features of the construction of warships. There is, however, nothing of a corresponding nature in regard to machinery in this country; but the Americans are carrying out a suggestion made thirty-five years ago by Mr. Isherwood, at one time engineer-in-chief of the United States Navy. As a preliminary, no less than twenty-five subjects are suggested as suitable for occupying the activities of this new American department, of which the following is a list:—

1. The value of liquid fuel for naval purposes.

2. The possibilities of the steam turbine for installation in warships.

3. The form of a propeller.

4. The relative advantages and disadvantages of in-turning and out-turning screws.

5. The reduction of vibrations of machinery.

6. Limits of economical increase of steam-power.

7. The development of practical appliances for utilising the advantages of superheated steam.

8. A rational ratio of sizes of cylinders for multiple expansion engines.

9. Improved systems of economy in auxiliary machinery of naval vessels.

10. The value of condensed fuel, such as briquettes, etc.

11. The relative advantages of straight and of bent tubes for boilers of torpedo boats, gunboats, cruisers and battleships.

12. The corrosion of boiler and condenser tubes.

13. The relative value of various alloys for machinery purposes.

14. Types of valve gear most suitable for naval purposes.

15. The endurance of the storage battery and its possible development.

16. The more extensive use of steel castings.

17. The question of lubricants.

18. Calibration of gauges and of instruments necessary for naval engineering purposes.

19. The proportions of centrifugal fans.

20. The most effective systems of forced draught for various classes of warships.

21. Mechanical refrigeration—the present method of cooling magazines being far from satisfactory.

22. Testing non-conducting and fire-proofing materials.

23. The determination by actual test of the best proportions of important engine details.

24. The study of the problems of how to secure more complete and definite information upon trial trips.

25. Reliable form of water-glass gauge that will be applicable for forced draught conditions as well as when muddy feed water is used.

Engineering defects in the manœuvres.

The narrative of the naval manœuvres for the past year is given on another page of this issue of the *Naval Annual*. The official return, however, contains a table which refers especially to the engineering section. In this details are given of the machinery and boiler defects that occurred during the manœuvring. They are somewhat numerous, although many of them are not of an important nature. The table contains a great deal of instructive matter, and we therefore give it in full.

Ship.	Defects.
BATTLESHIPS.	
Venerable . .	Junk ring of port I.P. cylinder broken. Two studs of fastening in starboard I.P. cylinder broken; this engine was refitted and steamed perfectly. Port engine broken down. Ship returned to Gibraltar for dockyard repairs.
Exmouth . .	Metallic packing of L.P. piston rod gave out, starboard engine stopped for 22 hours. Ship was able to steam at 12 knots after repairs.
Empress of India	Port engine stopped for hot bearings for 14 hours, ship left behind by "B 1" Squadron.

Ship.	Defects.
CRUISERS.	
King Alfred .	1. Starboard I.P. cylinder cover joint gave out. 2. Port intermediate brasses ran. 3. Thirty-two studs securing anchor bracket fractured. Ship was able to steam 18 knots after repairs.
Powerful . .	1. Compelled to stop port engine to clear crank pits of water when going 18 knots. 2. Go-ahead guide surface of starboard L.P. engine heated. 3. Three glands of main stop valve leaking badly. 4. Fusible plugs blowing out. Ship returned to Gibraltar for dockyard repairs.
Diadem . .	Engine defects reducing speed to 15 knots until remedied, and continuous loss of water. Ship returned to central rendezvous for a time.
Spartiate . .	Tube of port main condenser split and leaked badly. Ship was able to steam 19 knots after repairs.
Blake . . .	Crown of combustion chamber in one boiler came down. Ship returned to England for dockyard repairs.
Drake . . .	Starboard after L.P. crank-pin overheated and scored at 100 revolutions, and did not run afterwards at over 75. After repairs ship was able to steam 12½ knots until end of the manœuvres.
Hogue . .	Reported on 8th August speed reduced to 12 knots for five hours owing to repairs necessary to starboard engine; repaired.
Sutlej . . .	Water disappeared from No. 5 boiler. Priming. At 99 revolutions port I.P. crankhead brasses and main bearings on each side became heated (three times), and could not afterwards run at over 84 revolutions.
Æolus . .	Branch of auxiliary feed-pipe carried away; main feed to forward boilers temporarily disabled owing to cover of float tank giving out; repaired.

CHAPTER VII.

Commerce and War.

Historical considerations.

The Phœnicians, the Greeks, and the Romans have all in their turn depended on sea-borne food supplies, but history does not afford an example of a nation so dependent as Great Britain on oversea communications. The most familiar instance is that of Holland in 1654, but even Holland possessed land frontiers. The interruption of the Dutch sea-communications by the British Navy, however, produced so much internal distress as to force them to sue for peace. It was the operations of fleets, and not of mere commerce-destroyers, which ruined Dutch commerce. The underlying lesson which I wish to convey is that the attack on commerce is only efficacious when based on the successful action of fleets. This can be seen from an examination of other periods. In 1776–1783 our battleship strength was inadequate. Professor Cunningham, in "The Growth of English Industry and Commerce," says of this period: "On the whole it appears that the frightful increase of risk attending all commercial operations was the principal evil of the period, rather than the mere interruption of any one branch of commerce." Contrast this with the year of Trafalgar, when, as was asserted at the time, "not a single merchant ship under a flag inimical to Great Britain now crosses the Equator or traverses the Atlantic Ocean . . . With the exception only of a very small portion of the coasting trade of our enemies, not a mercantile sail of any description now enters or clears from their ports in any part of the globe but under neutral colours." An account of our position is quoted by Professor Cunningham from a German work—Reinhard's "Concise History of British Commerce" (translated 1805):—

> The English are now in possession of the greater part of the commerce of the world, and by these means have it in their power to fix the standard price of almost every commodity. They have, besides this, immediately after the commencement of the present war, captured from the French and Dutch great numbers of ships with rich cargoes, the amount of which is estimated to exceed £14,000,000 sterling.

It was because the battleships had decided the matter that insurance risks tumbled down 18 per cent. after Trafalgar, and it was probably because we were too intent on providing for the direct attack and defence of commerce, that Nelson entered the Mediterranean in search of the French fleet, prior to the battle of the Nile, without a single frigate for scouting duties, and so narrowly missed terminating Napoleon's fortunes at sea.

The last Anglo-French wars.

The French Revolutionary and Napoleonic wars are of particular interest in that they involved attacks on the largest scale ever attempted against commerce. Every ship and row-boat, every slip, river bank, and harbour was pressed into service. Even the movements of armies were dictated by the desire to stop our commerce. Yet, during the twenty years of war, though we lost 10,871 merchant vessels, or about half the number on the register in any one year, this only averages 543 vessels per annum. Taking an average of 14 years, we had on the register 22,925 vessels, so that the percentage loss would be 2·36 per cent. Now the register undoubtedly retained in many cases the names of missing vessels in default of evidence as to their loss, and a careful calculation convinces me that the outside error is about 1500 vessels, so that, allowing for this, the percentage loss was 2½ per cent. At the present time we annually lose about 500, or 2½ per cent., out of our 20,000 British vessels through wrecks, and we can build 1000 more to replace them. In the French War we were able to build 925 vessels per annum. We had in the year 1810 no fewer than 4023 vessels which we had captured from the enemy, and which were carrying our trade under the British colours. We captured a number of prizes in the way of privateers. Assuming 75 per cent. of the smaller war vessels which we captured were operating against commerce, we took no fewer than 1266 commerce-destroyers in the first eight years of the war, or at the rate of 141 per annum. This works out at five commerce-destroyers in exchange for 21 merchant vessels, and anyone to-day would think it exceedingly good business if we could take one commerce-destroyer for every four merchant vessels we lost. In addition, we captured in privateers no fewer than 41,000 seamen. These should be set off against our losses.

Insurance in war.

During the war, 1812–15, when we destroyed the United States trade, we lost 2300 vessels, but 750 were retaken, giving a corrected loss of 1550, while the United States lost 1407 vessels. Our trade, of course, went on, while American trade ceased. Reading Marbot's Memoirs, I remember being very much struck by the French general's account of how Masséna and others amassed large fortunes by secret agreements with British shipowners. The ships were voluntarily captured, and were then taken into port free of all duty. No allowance has been made in my calculations for these so-called losses. In 1810 the Select Committee of the House of Commons on Marine Insurance reported that our sea trade, coasting and foreign, was worth £321,000,000, of which nearly 50 per cent. was uninsured. It was natural when underwriters were exposed to frauds that they should favour convoys, and that rates on vessels

sailing without convoys should tend to become prohibitive. Nevertheless, the fact remains that vessels did continue to trade, and one-half of our shipping trade was uninsured. Throughout the war the British shipping cleared outwards was at its lowest ebb when St. Vincent was forced by the allied fleets to abandon the Mediterranean. It was the sole success of any magnitude scored by our opponents against commerce, and it was, contrary to the arguments advanced nowadays, won by battleships.

Conclusions to be drawn.

If, then, we assume that 2½ per cent. of our shipping is liable to capture, and that 40 per cent. of our trade is done by neutrals, the risk to our total supplies will be 1½ per cent., or about 3½*d*. in the pound. I am far from contending that such a loss will be incurred, for the dangers likely to be encountered by our commerce are less than was formerly the case. The greatest risk of loss lies in the nervousness of commerce which has been fostered by numbers of writers who have given inadequate study to the subject. In saying this, I of course assume that we have sufficient battleships for commissioning fleets to deal successfully with the fleets of probable opponents, and an adequate supply of cruisers to act as scouts, look-outs, and for the purpose of lying off certain ports of refitment to which the commerce-destroyer may resort. A strong navy is to England a complete defence; a weak navy is no defence at all. It is necessary to make this amplification of de Tocqueville's words, "Experience proves that no commercial prosperity can be durable if it cannot be united, in case of need, to naval force."

Inevitable nature of the problem.

We are absolutely dependent on oversea supplies of food and raw material. This is recognised by our rivals, though the conditions of the problem do not appear to be so well understood except by a select few like M. de Lanessan. Unable to gain superiority of type and number of battleships, on which ultimately depend the command of the sea and the maintenance of communications, and therefore of commerce, the French have ever instinctively sought for something which, to use a military term, will "turn" the position of the battleships opposed to them. Hence the popularity of the policy of attacking commerce; of the torpedo boat yesterday and of the submarine boat to-day. When introducing the Navy Estimates in 1899, Mr. Goschen pointedly drew attention to the fact that the policy of "some of our rivals" was "to endeavour to wear out the patience of this country by prolonged attacks upon our commerce, our food supply and our sources of production. They think," he added, "that while our battleships would be lying opposite their ports, they would be able to swoop down upon our commerce, until this country tired of the uncertainty and the injury inflicted upon

us, and of the flag being transferred to other nations. It has been avowed in the most distinct terms. Scientific and professional writers and politicians and statesmen have all commended this plan; and, what is more, they have acted upon it. The plan now is to build very fast cruisers which shall prey upon our commerce, and which shall inflict that damage upon us which I have attempted to describe."*

Foreign opinions.

The First Lord of the Admiralty could have obtained ample quotations from the speeches of distinguished men in France. M. Lockroy, the ex-Minister of Marine, said that "by launching some fast cruisers or torpedo-boats on the great trade highways, it would be possible for us to starve Great Britain, to suppress her commerce and to ruin her industries." M. Delcassé, when out of office, said in the French Chamber on December 12, 1896: "We (the French) must avoid general actions with the same perseverance that England will try to bring them about, and direct our efforts to where she is most vulnerable. For that purpose the first quality we require is a high rate of speed, and the power of steaming a long way without having to take in a fresh supply of coal." There is no object in quoting the numerous influential French naval officers. These include officers of such diverse opinions on other subjects as the late Admiral Aube, the founder of the *Jeune Ecole*, and Admirals Fournier and Réveillère. The French Budget Committees of 1899, 1900 and 1904 reported in favour of shipbuilding programmes for commerce destroying. It is our business to consider what measure of success is likely to attend this policy. We have to deal with the idea as a definite policy to win a war, and not as one inspired by a demoralising greed for prize-money.

Torpedo operations against commerce.

The historical parallel is the operations of the French privateers, ranging from armed row-boats to big sailing vessels, attacking from headlands on French territory which our sailing vessels made for the correction of dead reckoning. At these places, as Captain Mahan has pointed out, the merchant ships were frequently becalmed. We found it necessary to capture the West India Islands and Mauritius in order to root out the nests of the privateers, a policy which Macaulay derided as "Pitt's sugar-island policy." Our merchant vessels in the Napoleonic war were of poor sailing qualities, built with a view to the heavy port dues, which took account of length and breadth, but not of depth, and hence was evolved what were known as "coffin ships." With crews depleted by the press-gang, they fell an easy prey to armed row-boats. They could not purchase safety by hugging the neutral shore as steamers can do. The modern

* *Parliamentary Debates*, March 9, 1899.

torpedo-destroyer, reputed to do over 2000 miles at ten knots, can only do 200 miles at full speed. If, through the superiority of the British fleet, the operations of the French torpedo craft, like those of the Russians in the present Russo-Japanese War, are restricted to darkness, their work is exceedingly difficult. In the 1901 manœuvres, of the 28 so-called captures reported by the X fleet, only one was at night. One gunboat reported two steamers captured in twenty minutes in the early morning and two more steamers in the forenoon within three-quarters of an hour of each other. This shows the ridiculous nature of the so-called captures. The extent of French coast-line in the Mediterranean is immaterial. In the 1901 manœuvres the A fleet had the whole coast-line of England at their disposal, and yet in eight days out of 32 fast destroyers they lost 16, and 6 were disabled for one-fourth of the period of the war. They only torpedoed one cruiser. Supposing that their efforts had been dispersed in an attempt to attack commerce on the wholesale scale contemplated by France, is it not highly probable that their position would have been infinitely worse? Toulon is over 700 miles from Gibraltar and over 600 from Malta; Bizerta is about 750 miles from Gibraltar and 250 from Malta. For these two arsenals and the torpedo stations at Corsica and Oran, we should absorb six divisions of destroyers (of eight vessels each) with their mother ships. The French torpedo craft would have to run the blockade both in going and coming. All tasks in war are formidable, but this is certainly not to be reckoned among the most difficult. The task can, of course, be rendered difficult if we pursue diverse aims and fail relentlessly to follow up the main issues of war, which must be to capture or destroy the enemy's fighting force. It is, however, urged that a state of affairs can be produced by a war on commerce, in which rising prices and intercepted food-supplies will make it impossible for one-third of our population to live. We must perforce devote some attention to this aspect of the case.

Prices in war.

A passing reference to the effect of war on prices and wages is advisable. The statistics of pauperism in England and Scotland, during the Crimean War, when there was a great rise in the price of bread, were stationary. The countries injured by a rise of prices are generally the poorest countries, which are not necessarily belligerents. The belligerent is under the artificial stimulant of an annual national war expenditure of from £20 to £40 per adult male, which is mainly borrowed from posterity. The time of distress need not be during a war, but rather on its conclusion, especially if the financial resources of the nation have been unduly strained. This was the case in 1818 during peace,

when wages had dropped 40 per cent. from the high level of the war, and it was then that the worst riots occurred and the great emigration took place. The Napoleonic war was, however, a very prolonged one, and one of the chief causes of distress, after it had been raging for some years, was the depreciation of the currency. This depreciation amounted to nearly 21 per cent. in 1812, and of course lowered the purchasing powers of wages and impaired our credit. The only conclusion to be drawn is that wars should be short and decisive, and while this can be achieved by mobile fighting force, it can never be done by sedentary defences or granaries.

Our supplies.

In considering the food-supply we must remember that we import a great quantity of feeding-stuffs for our live-stock, which in weight amounts to a good deal more than the wheat imports, and which, by feeding our live-stock (with maize and other cereals), gives us a large proportion of the meat, butter, milk and eggs derived from the home supply. It has been shown that our soil is dependent on imported fertilizers to the extent of 13½ lb. per acre. Nearly 1½ million horses are employed in the agriculture of this country, and these, again, are mainly dependent on imported corn. So it will be seen that no mere tinkering with the food-supply problem will save this country if our Navy fails. It is not a question of wheat alone, but of other supplies too. The Government, in appointing a Royal Commission in 1903, in response to an agitation about our wheat supplies, wisely decided that the Commission should inquire into the whole of the supplies of the country. The iron ore, the cotton and the timber are necessary to the workers to earn their wages, and if these supplies are cut off we should experience a repetition on a large scale of the disastrous Lancashire cotton famine. The only countries with deficient wheat supplies are the United Kingdom and the whole of western Europe as far east as a longitude which would enable us to embrace Italy, as well as Norway and Sweden. The largest market is of course found in England, and the bulk of the wheat supplies come from North America. A glance at the map will show the truth of what Emerson said, when he pointed out that England's best admiral could not have anchored her in a more favourable position. She is the richest country and nearest market for the food-supplies from America, and has the great advantage while her coal production lasts, of always being able to offer a return cargo. Even if the American exports for food are not destined for England, they pass her ports. The bulk of the Continental trade is carried in British vessels, and in a moment of real emergency no cabinet would hesitate to order the grain-laden ships to make a port in England. Our wants can now be

cabled at once and complied with in a fortnight, whereas formerly, under sail, the sea-journey conveying an order to New York took two months. Continental nations have, on the other hand, gained as compared with ourselves in the ability with which they can be supplied even with contraband of war by railways from neutral territory. This is the position of every country except Great Britain and Japan, and both nations, by the conditions of their being, are driven to seek their fortune on the sea in order to preserve their communications.

The position of neutrals.

This question of supplies passing by neutral territory and shipping is one of the many old difficulties liable to occur in war and which render a commercial blockade of any of the Continental Powers of doubtful value. In the Crimean War the supplies of Russia entered largely through Germany. Even in the Napoleonic War the supplies found their way into French territory through neutral markets by river, road and canal. The French threw open their colonial trade to neutrals in war, a proceeding against which Nelson inveighed in the House of Lords in 1801, when he declared we ought to shed our last drop of blood rather than give up the right of search. On that occasion he declared that, as for contraband of war, he would be grateful to anyone who supplied the French with stores if it would induce their fleets to put to sea. Certainly the neutrals were very largely interfered with in this war, and frequently sought English convoy. Those bound to France were insured at very high rates indeed. The speeches of statesmen and the judgments of prize courts bear witness to the irritation created in England by this neutral trade. The system of bills of exchange is such that by their transfer, exports from this country to a neutral may be ultimately paid for by exports from the neutral to our enemy. In a war with Germany, we might see British capital developing the Dutch harbours, railways and canals, and so facilitating German supplies. We might see a repetition of the process by which France threw open her colonial trade to neutral shipping during war only to resume it during peace. I have mentioned these instances to show that direct operations against commerce are a very doubtful policy; in fact, more so than formerly. The mere threat caused by the successful operations of fleets is quite sufficient to arrest the commerce of an opponent. Russian sea-borne commerce to the Far East in the present war was stopped altogether because the Japanese Fleet had command of the sea in the Far East. Throughout February and March Japanese commerce in the Mediterranean had ceased because the Russian squadron had command of the Mediterranean. In the war of 1898 the whole

Spanish Trans-Atlantic trade was laid up, and there were many in Spain who pointed mournfully to the huge financial losses and the difference a well-found squadron of battleships would have made. The battleships are everything, while the desultory operations of cruisers have limits set to them, not only by the victorious fleets, but by the declarations of neutrals which a weak belligerent is bound to respect.

Neutral's declarations.

The recent declaration of the United States has shown that one of the great Powers is not prepared to allow the seizure of neutral owned goods which are not contraband of war on board of a belligerent's vessel. The declaration also refuses to allow food to be treated as contraband of war unless it can be shown that the food is destined for the use of the enemy's army or navy. This is of great importance, for it may be said that the United States dominates the export grain and provision trade of the world, as the United Kingdom dominates the export coal trade. The declarations of all nations agree with the practice of America's Civil War period, that prizes cannot be carried into a neutral port. The Government of Egypt has refused to allow any vessel seized to be taken into the Suez Canal. It is obvious that these considerations present difficulties to the commerce-destroyers which are ignored in some of the paper attacks on commerce formulated by alarmists. The practice of the British, Egyptian and American Governments, to allow only 24 hours in port to a belligerent, after which she must not visit another national port for three months, is likely to be the rule of all nations in the future. The position taken up by France and Germany is ambiguous, but the hospitality afforded by the French port of Jibutil for several weeks to the battleship Oslabya, the cruiser Aurora, Dmitri Donskoi, three transports, three torpedo boats and seven destroyers, went beyond all precedent and is likely to form the subject of negotiations after the war. To restrict the aid granted by neutrals in coal, anchorage and refitment to a belligerent is for England a matter of the first importance. A second line of policy is indicated to us by the unique position we occupy in dominating the export steam coal trade of the world.

The coal trade.

French and German coal have about three-fourths of the efficiency of South Wales coal, so that if we could cut off the supply of certain kinds of Welsh coal we should at the same time impair the endurance and speed of our opponents, while rendering them more visible through having recourse to smoky coal. There is no more reason why, in time of crisis, we should not prohibit the export of certain kinds of coal than there is for Austria prohibiting the export of radium, or Russia prohibiting the export of food or horses. The

effect of such a step would be immediate in providing us with the best coal, while at the same time depriving our probable opponent of a supply on which he is accustomed to depend. Sent only to British ports for the supply of British shipping in war, it would give an advantage tending to compensate for the extra war risks. This dependence of Europe is shown by the fact that six vessels a day, carrying in all about 9500 tons of coal, leave Cardiff for France.

The best distribution of defensive expenditure.

Except by coaling at a rendezvous at sea, predatory excursions such as that of Richery to Newfoundland in 1796 are impossible to existing European squadrons. In the American Civil War three of the Confederate cruisers were lost through inability to obtain coal, and for a similar reason the German Augusta was unable to proceed from Vigo, in 1870, before a vessel was sent to shadow her. By keeping the position of our cruisers unknown and maintaining a careful watch on such ports as commerce-destroyers are likely to use for coaling and refitment, we ought to be able to capture them very early in a war. Certainly I see no good in basing cruisers at the end of telegraph wires, so that their position is known. Patrols and fortifications at ports of refuge are unnecessarily wasteful, while convoys are more dangerous to friend than to foe. If by leaving our mercantile ports without fortifications we can tempt an enemy to attack, then let us do so by all means, in order that we may capture him. The people who want to be safe at all points never seem to realise that we ought not to wage war without holding out tempting morsels to the enemy, even as when we go fishing we bait our hooks. A similar parasitical desire to attain absolute safety is responsible for many futile proposals for dragooning commerce in war by readjusting the ports or routes frequented.

The accommodation of ports.

Though commerce can adapt itself in many ways there is one direction in which peace and war alike show that there is very little flexibility. This is in the accommodation of ports. Unless the accommodation in wharves, quays, docks, railways, elevators, storehouses, etc., has been provided it is no use sending commerce to the port. There is a great need to bear this point in mind, for arguments are constantly advanced that blockade means the blockade of every inch of an enemy's coast. It simply means the closing of the principal ports, relying on the knowledge that the minor ports will never be able to handle the traffic. Thus 68 per cent. of our trade in values is through London, the Mersey and the Humber. Even a big port like Sydney (N.S.W.) cannot adapt itself to a special trade without building up the facilities for that trade. For instance, in 1901 Sydney exported wheat, and a typical German cargo-carrier, the

Brisgravia, of 6463 net register tons, with a measurement cargo space of 14,000 tons, took in 5500 tons of wheat. She had all the latest facilities on board for rapid work and nine capacious holds. The captain stated that in consequence of the want of facilities at Sydney the work of shipment occupied fourteen days, whereas in New York it would have taken one day and a half. Delays of this kind on a large scale mean a failure to get supplies in and out, and have an important bearing on proposals for changing trade routes in war.

The Suez Canal route.

As an example, we may say at once that there seems to be little use in considering the proposal to abandon the Suez Canal route. The alternative Cape route cannot be considered at less than twenty-five to thirty days longer for tramps. The Mediterranean trade passes along our strategic front in a war with France and Russia in the sense that our fighting forces and their communications will be along the route. It is, therefore, heavily defended, and to shift to the Cape route is like turning from a well-defended railway to a circuitous caravan track. The ports along the route are adapted for the existing commerce. When the strain of the South African war was thrown on Cape Town, vessels were kept waiting for months, unable to get their cargoes cleared, and even at Southampton there was a great glut of goods.* The strain thrown on Cape Town was not a great one from the point of view of a well-equipped port. The coaling operations would have been child's play in the smooth waters of Port Said, but at Cape Town they were accustomed to their seven steamers a week. Now, if the Suez Canal trade were thrust on the port it would mean ten times as many separate coalings as Cape Town is accustomed to. That the block along the route under these circumstances would be infinitely worse than any artificial block involving a temporary delay, and produced by sinking a ship a few feet in the Canal, is sufficiently obvious. The Egyptian Government must take care that a watch is kept on the Canal, and guards placed on board vessels belonging to belligerents while passing through the Canal. Ten vessels a day pass through, and there would be no difficulty in putting a guard on board each vessel. There is nothing to show that any conceivable block of the Canal would take more than a fortnight to remove. There is the clearest possible evidence that the extra time required for the journey to India by the Cape is greater than this imaginary delay, while the accommodation of the port of Cape Town would utterly break down under the strain. It is only by working steadily

* See Mr. Leyland's article in the *Naval Annual*, 1901, for statistics of the transport operations.

at these problems during peace through great thinking departments under the Government that we can hope to avoid the instability of purpose our naval policy has so often exhibited, as in the treatment of Wei-Hai-Wei, when extremes of policy have prevailed at different times.

The need of information.

If the Royal Commission which is now considering the supplies of the country both in food and raw material only succeeds in drawing attention to the poverty of our trade statistics from a war point of view, it will not have laboured in vain. It is not as if the task were a difficult one, for it merely requires that co-operation between the Government departments and private enterprise which the best intellects of our day are now trying to bring about between different government departments. It is, for instance, of the greatest importance that we should be able to know the prospects of about fifteen of the best steam coal mines in South Wales which occupy 180 square miles of field; and where and by what steamers this coal is sent for each week in the year. We should then be ready to intercept or buy it up on the prospect of a war. Here co-operation between the Government, the mine-owners and the middlemen is all that is needed. Again, how are we to answer the question, is the supply of shipping to carry cargoes in war likely to be in excess of the demand? We must obviously induce Lloyd's and the various port authorities to give us much more detailed information than they now furnish. We would like to know, not only as the Navigation Returns tell us, the shipping entered and cleared with cargoes and in ballast, but we should also require more detailed information as to the vessels entered and cleared with cargoes. What proportions were full up or only half full? There is all the difference in the world between the Baltic entering with 1000 tons of cargo and on another voyage entering with 14,000 tons, or between the Lucania with a full cargo of 1500 tons and a modern cargo carrier with 12,000 tons. The Baltic bulks equally large in both the above cases in the Navigation Returns, for these simply give the net register tons entering and clearing. Why not obtain the cargo capacity of each vessel and the cargo carried? At present we are indebted to the private enterprise of Mr. John Williamson, of Liverpool, for our estimates of the tonnage volume of our imports and exports. In Germany this work is done by the Government. The Navigation Returns should give in all cases the cargo-carrying capacity of vessels entered and cleared and the weight of cargo carried. There is no difficulty whatever in ascertaining these particulars. All that is wanting is the enterprise to set the machinery in motion.

The benefit of discussion.

The old argument about letting the world know how vulnerable is our position is plausible but dangerous. There is no harm in placing any detail of our position at the disposal of foreign Powers, provided we take care that the organization for defence is adequate. It is the essence of our constitution that we should be ruled by discussion, and it is significant that the old War Office, which had consistently burked discussion on the above-cited grounds, came to an end in a chorus of condemnation. It is only shams that need to be shrouded behind a veil. The insurance of our supplies in war needs a thorough knowledge of those supplies. If the facts are known the insurance can be provided, and then there is nothing to fear. At the present moment the public is largely at the mercy of any faddist who chooses to get up a scare about one phase of our commerce in war, such as the food supply or the defences of the Bristol Channel, Clyde, Mersey, Thames, or any other mercantile waters along our 42,000 miles of coast-line. The problem is considered piecemeal, and more harm than good is done. If representative government is to succeed, it must be based on the fullest discussion; if despotism is to succeed, it cannot permit the interference of an ill-informed proletariate. We had to choose between one system and the other. We elected for the former, but we have never courageously faced the consequences of our choice. Governments tend to perpetuate old-fashioned methods. Public discussion tends to call attention to the effect of changes going on which must necessarily react on naval policy. No reasonable person can doubt that the Admiralty have benefited by discussion as to the distribution of our ships, which modern changes necessitated re-grouping.

The changes going on.

The commerce of the world is constantly altering. There are the changes brought about by geographical discovery. The greater part of the world was geographically unknown in 1800. Very little now remains to be discovered. Geologically it is different, and fresh coal resources are being opened up every day. Engineering enterprise brings new problems to our doors. The creation of the Suez Canal revolutionised our trade with the Far East. Here is a centre from which trade radiates to any port in the world. The three British Directors have unique opportunities of furnishing us with valuable information. The want of cohesion between one part of the Government and another is probably the reason they are not required to do so. As an instance of this absurdity, the Board of Trade is allowed to show reports on trade from our commercial attachés or consuls, at 43 Parliament Street; but if a newspaper wishes to publish them for discussion, permission has to be sought from the Foreign Office. To obtain information about the Suez Canal, not

contained in the annual reports, the Admiralty would have to approach the Foreign Office. This is government by circumlocution, and not by discussion.

The Suez Canal.

The Reports of the British Suez Canal Directors can be improved so as to assist the defence of commerce by recognising the universal need of standardisation in statistics, and giving us, as is done by all nations except Portugal and Spain, statistics of tonnage passing through in net register tons and in cargo-carrying capacity, as well as the present information in Suez Canal net tons. The average tonnage of the vessels should also be in net register tons. If, furthermore, the vessels are classified, we should be able to judge how many of them are fit to go round the Cape in the event of a resort to that route, for it should always be remembered that the average tonnage of the Suez Canal steamers is probably over 1500 tons smaller than that of the average Cape steamers. An exact figure is not possible, owing to the information for the Suez Canal being in Canal tons, which makes the tonnage higher than net register tonnage. Thus the Borneo is 3548 tons in Suez Canal measurement, but her net register tonnage is 604 tons less. In addition to the question of the fitness of the ship for the voyage round the Cape, there is the question of the fitness of the trade itself for encountering the longer route, as, for instance, when it is one in perishable goods.

Influence of invention.

The frozen meat trade is the growth of recent years and is the result of the invention of refrigerating processes. The economies which have been wrought in the handling of materials have caused great changes. The freight from Chicago to Liverpool has fallen between 1870–1902 from 100*s.* 3½*d.* to 20*s.* 10½*d.*, while the supply we drew of wheat and flour in its equivalent of wheat, from the United States, has increased 100 per cent. to 3,500,000 tons. But the shipping can now adapt itself to immense differences in a very short period. In 1902 we imported 36,500,000 cwts. less maize from the United States than in 1900, while from Russia and Roumania we imported 21,000,000 cwts. more. Nothing but the admirable system of British tramp shipping ready to go anywhere could adapt itself to such variations. This tramp shipping has got to be defended, and a study of its activities for any one year is no measure of its activities in the following year. Although we are always hearing about the regular liners, it is well to remember that six-sevenths of our 8000 steamers are tramps, and this must continue to be the case so long as it costs over six times as much to build a steamer to carry 10,000 tons of cargo at 20 knots as it does to build one to go 10 knots.

Sailing ships.

It is this tramp shipping which is driving out the British sailing ship, so that the sailing trade is now becoming relatively insignificant, as the following table shows:—

UNITED KINGDOM TRADE.
(Figures in 000,000 tons.)

Total Shipping.		British Sailing Ships. Entered and cleared.	
Year.	Entered and cleared.	Total.	Cargoes only.
1880	59	10·4	8·8
1890	74	5	4·3
1900	98·5*	2·4	2·1
1902	99·9†	1·9	1·6

* 1·6 million tons for war in South Africa excluded.
† 1·1 million tons for war in South Africa excluded.

It is quite clear that when only 1½ per cent. of our trade is in sailing ships, the operations of the Alabama and her consorts, which were conducted against sailing ships, have very little significance for us.

Surplus tonnage offering.

Another point to bear in mind is that in England, especially in the import trade, we have far more tonnage offering than we require. We can roughly illustrate this by referring to the fact that, whereas 88 per cent. of the entrances and 71 per cent. of the clearances in the United Kingdom's trade in 1840 were with cargoes; in 1900, 73½ per cent. of the entrances and 88½ per cent. of the clearances were with cargoes. The coal trade has made the difference, so that whereas the percentage entered with cargo of that cleared with cargo in 1840 was 124 per cent., in 1900 it was only 83 per cent. In 1901, 6,682,000 tons of British shipping entered in ballast, and 3,152,000 cleared in ballast. To the above entrances must be added about 6,000,000 tons of foreign shipping entering in ballast and desirous of bringing in supplies. Of course, many of these would be passenger vessels, but, in addition, it should be remembered that the ships carrying cargoes do not nearly carry full cargoes. Thus 82,700,000 tons entered and cleared with cargoes in 1902, and Mr. Williamson's estimate of the weight of the cargoes was 109,000,000 tons. It is certain that the shipping could have carried at least 150,000,000 tons instead of 109,000,000, so that we have an immense reserve to replace the waste of war, apart from our building facilities. There would be, in addition, the British shipping thrown out of employment in the trade with our opponents, which in the event of war with France

and Russia would amount to 11½ per cent. of the British shipping entered in the United Kingdom trade. On the other hand we must deduct from our available tonnage the demands of our War Departments.

The Secretary of Lloyd's, Colonel Sir H. M. Hozier, has advocated convoys for all vessels of under 14 knots as absolutely necessary. The convoy system is at best a distasteful system of dragooning commerce, and under the above proposal would apply to 80 per cent. of British shipping. I do not think Sir H. M. Hozier took sufficiently into account the waste of naval force defending the convoys, and the operations of torpedo craft against them. If merchant ships place themselves under the protection of a military force they become part of that force and can be fired at. The safety of commerce is in the superiority of our fighting force in face of the enemy's force. The provision defenceless ships make for their own safety on the sea lies in their enormous power of concealment. We may have five to six thousand British steamers on the high seas at any given moment, but how many does one meet except at the converging points like the British Channel and the Straits of Gibraltar, which our fleets are covering by their operations against the enemy? To the naval officer this utter emptiness of the view at sea is a fact borne in upon him by every day spent at sea, and the power steamers have of varying the route will only intensify it in war. In the old sailing days vessels might be months at sea, and then have to make an enemy's headland for the correction of dead reckoning with the risk of being becalmed. Every extra day at sea is we know an extra risk to ship and cargo, but as commerce was once not highly organised nor dependent on regular supplies at certain times the convoy system was very advantageous. Since twelve points of the compass or six on either side of the wind formed a safety zone, it was possible to dispose a strong protecting force so that a smaller attacking force could not get at the convoy without first encountering the protecting warships. To-day it is very different. Supposing we were at war with France, and the French torpedo craft saw the smoke of a convoy on the horizon. After making sure that the smoke is not from their own ships nor from a division of destroyers, they would dash in during darkness and fire into "the brown of them." It is easy to conjecture the very different state of uncertainty concerning only one vessel that is sighted at night. She may be a destroyer or a German cargo boat. If a destroyer, it would go hard with the torpedo boat in the clear nights of the Mediterranean. If a merchant vessel, how is her nationality to be ascertained without a close approach? There is very little difference between merchant ships of different nationalities,

Convoys.

and most of them have been built in British yards. To use a searchlight would be to court destruction, and yet the chances are nearly even that the vessel is not British, and to board and examine her papers without an armed force is a risky proceeding, for the vessel might make off, holding the officer as hostage. The neutral owned cargo cannot be seized, and the prize can only be taken into the belligerent's port. A prize crew cannot be spared. This anxious process is repeated in the case of each steamer. Each one protects the other and is protected by the neutral, by causing delays and expenditure of coal to the commerce-destroyer along a short route, where the fleet's line of communication lies, from Gibraltar to Malta, and if they draw the enemy's torpedo craft far away from the base, the latter's capture is fairly certain.

Exaggerations concerning commerce destroyers.

The prowess of the commerce-destroyer is systematically exaggerated even when we grant her the use of the best Welsh coal. The Chateaurenault was supposed to be able to steam from Toulon to Saigon without recoaling. In the words of a committee of French naval officers, she could not even get as far as Singapore, and was recoaled at Colombo. The Guichen and Jurien de la Gravière were equally unfortunate. The Guichen when ordered, during the Boxer outbreak, to proceed full speed to China was only able to average 14½ knots. On paper the Jurien de la Gravière has a coal endurance of 9300 miles, but her trials only indicated an endurance of about 4000 miles, while the coal distributed in 70 bunkers is exceedingly difficult to stoke. The dirtier the ship's bottom gets after being out of dock some time, the lower the coal sinks in the bunkers; the dirtier the boilers, the greater will be the reduction of speed. If she captures a tramp she takes a vessel the nation can easily spare with 15 or 20 unskilled men. If she herself is captured from 400 to 700 men are lost to the naval service. If she takes her prize into port, her speed is limited by that of the prize, and she probably cannot spare more than one prize crew, for in these days warships carry bare complements, and if the engine-room is not assisted by deck hands we find that the ship can only proceed at two-thirds power. When the commerce-destroyer shows herself near the land the whole world is informed by telegraph. As I pointed out in last year's *Naval Annual* in the chapter on submarine cables, information is a great deal more important to the hunter than the hunted.

Information leading to capture.

In former times almost the sole means of information was from passing vessels. Such information led to Howe fighting the famous battle when the French convoy got through and rescued France from famine. Villeneuve, when he sailed from Toulon on April 1, 1805,

was only prevented by a lucky meeting with a neutral vessel from sailing right into the British Fleet. Nelson obtained news of Villeneuve's departure from a neutral brig two weeks later. When Gauteaume's fleet was at large in the Mediterranean, in 1808, Collingwood complained that "at sea there is no getting intelligence, as there used to be on former occasions, for now there is not a trading ship upon the seas—nothing but ourselves. It is lamentable to see what a desert the waters have become. It has made me almost crazy." We obtain by means of Lloyd's Lists in the middle of the eighteenth century a good idea of the rate news travelled. Gravesend sent information to London generally in a day or two; Bristol in from two to three days; Falmouth in three; and Cowes and Southampton one to two days. News from the Scottish ports took from eleven to fifteen days. Of the foreign ports Lisbon figured most prominently as a resort for shipping, and news used to come in after about a week. Leghorn and Cette took twelve days; Hamburg generally more than a fortnight; and New York a good two months. There can be no doubt that the regularity of steam commerce, in association with the almost instantaneous transmission of news by the telegraph, has enormously increased the disabilities of the weaker maritime Power indulging in the tactics of evasion, and will hamper the commerce-destroyer at every turn. Thus the exact distribution of the Russian ships was known before ever the present war was commenced. And whenever during the war there has been any attempt at commerce destruction or exercise of the right of search, the fact has been known within twenty-four hours, together with the approximate position of the enemy. The question arises whether anything can be done during peace to strengthen and organise these natural sources of information which exist in our mercantile marine.

Signalling in the mercantile marine.

Distinguished officers have drawn attention to the inadequacy of the arrangements on board many merchant ships for communicating with the shore and with other vessels. The Secretary of Lloyd's, in 1902, stated that "some shipowners are so exceedingly careful in their expenditure that they will not even pay money for flags for signalling." The Admiralty might well appoint a small committee to go into the whole question. Every merchant vessel at sea prior to the outbreak of war is, in a certain sense, a scout which may bring in information of value, and the methods of stopping and sending a boat, or using a megaphone, are too slow. Lord Charles Beresford has proved his point by the common-sense method of making practical attempts to communicate with merchant vessels at sea. It takes an intelligent lad four months to learn Morse, but it does not take a

month to learn the naval system of flags, and perhaps two months to learn to semaphore. Surely an understanding could be arrived at between the Admiralty and the shipowners about signal-training so that there could be at least one fairly trained signaller on board each ship of the principal companies. At present there is likely to be great waste of time in getting information from passing merchant vessels. Some of the leading liners are using wireless telegraphy, and this will enable a much wider field to be covered than by signalling.

Shadowing.

The best methods of defending commerce are undoubtedly those by which in the first place the enemy's fleets can be attacked and demoralised, and in the second the commerce-destroyers are isolated and fought. During peace a careful record is kept of their movements so that, for instance, the positions of the fast North German-Lloyd's ships on any day are known, and they, as well as the enemy's warships, can be shadowed from the moment a crisis becomes acute. The Russian ships in the Far East were shadowed in 1885 at the time of the Penjdeh incident. The policy of shadowing was the subject of diplomatic representation by the Russians in 1897, and though we withdrew our two cruisers from Port Arthur on that occasion, the policy is, in the view of the present writer, one that is indispensable to us, however irritating it may be to others. It would be, for instance, highly imprudent for us to abstain from shadowing not only war vessels, but also vessels such as the fast German-Lloyds in a time of crisis, before those vessels are taken from their mail duties to receive guns. In the case of such vessels, capable of steaming 23 knots, but offering huge targets with engines above the water-line, it would be folly to neglect the opportunity of terminating their existence at the very outset of a war.

The Cunard agreement.

The new Cunarders are intended as a reply to the fast German vessels, just as the Powerful was intended as a reply to the Rurik. The exceedingly costly nature of this step can be seen by the fact that we are to pay the Cunard Company £150,000 per annum, besides lending the money for building the ships at a low rate of interest. We shall have, in war time, to provide crews, and the cost of maintaining two crews of 650 men each will be, at £100 per head, £130,000 per annum. Clearly we have to train these crews in peace time, and therefore their cost must be reckoned. This makes £280,000, and we have yet to add depreciation, cost of guns, stores, etc. Taking a vessel of the County class, the following calculation shows that we could obtain nearly two Cornwalls for this sum.

	£
Interest on first cost at $2\frac{3}{4}$ per cent. . .	21,000
Annual depreciation for a life of 20 years .	38,000
Cost of 680 officers and men . . .	68,000
Repairs, say	13,000
Stores, say	12,000
Total	153,000

Armoured cruisers.

Now that armoured cruisers have reached 24 knots on trial trips, it is clear that, for the present, the unarmoured cruiser and the mercantile cruiser can no longer depend on their speed to escape. At the same time, armoured cruisers such as the Americans are building cost more than a battleship. Their number is, therefore, very limited, and if sent on a commerce-destroying or coast-raiding mission, a navy has always to bear in mind that if they are captured or destroyed they cannot be replaced in under two and a half years, while the damage they can hope to do could be repaired in a much shorter time. No nation is now building unarmoured cruisers. It will be noticed that at the outset of the war the Japanese formed a cruiser squadron of six armoured cruisers. This corresponds to our experience in naval manœuvres of the right number in a cruiser squadron, and it is the plan we follow in home waters and the Mediterranean. If, now, France were to endeavour to associate such a cruiser squadron with her Northern Fleet, and another with her Mediterranean Fleet, she would not be able to do so, and therefore still less could she spare a single armoured cruiser for the attack on commerce. To deprive her fleet of a screen of armoured cruisers at sea is to deprive the fleet of its eyes, and, therefore, if we could tempt our opponent to disperse the efforts of her cruisers to the attack of commerce, we would be exceedingly unwise to attempt to deter her. My belief is that the attack on commerce is nothing else but dispersion of effort, a proceeding which is never justified unless it results in greater dispersion on the part of an opponent. It utterly failed in the case of the raid on commerce made by the Vladivostock Squadron in the war now raging. I would strongly urge that not only should we follow the example of the Japanese and refuse to disperse our resources when at war, but we should apply the principle in our shipbuilding policy. It is not a proper provision for the defence of commerce to build a Powerful merely because the Russians built a Rurik. War is a business of positions, of positions occupied by fleets, and we should build to the requirements of those fleets, and not to satisfy a vain dream of setting one particular vessel to catch another. Commerce

is defended by the fleets looking after the main body of the enemy, while the few ships which break through are isolated by a watch being set on the probable ports of refitment or coaling. This, with their small force, and owing to the way the Alabama, Sumter, and Florida could economise coal by remaining under sail, the Northerners were unable to do adequately in the Civil War.

The Alabama.

The Alabama was propelled by steam and had auxiliary sail-power, so that remaining in the regular track of sailing vessels under sail she could economise her coal. Steam could then be used for purposes of chasing. Captain Semmes himself indicated how his career might have been terminated, and his operations had no effect on the small American steam shipping. There is no parallel whatever between such a vessel attacking over 2,000,000 tons of helpless sailing shipping, and a North German-Lloyd liner burning 650 tons of coal a day at full speed and operating against steam vessels. There was not then any means by which information could come by regular mail steamers, nor was there a huge network of submarine cables going to every port of refitment in the world. That vessels like the 23 knots German-Lloyds require to refit is shown by the number of engineers sent on board at the conclusion of each trip across the Atlantic. At the outset of the American Civil War there were but 30 steam vessels in the whole American Navy, not one of which was as fast as the Florida or the Alabama. The shipping was "protected" during the war over the whole vast expanse of the Indian Ocean by a single sloop. It was partly owing to the fact that the United States was torn by civil dissensions that the accommodation afforded by neutrals to the commerce-destroyer, as in the coaling of the Florida at the Bahamas, went beyond what would be tolerated to-day, when vessels can only demand enough coal to carry them to their nearest national port, and are then denied further use of the neutral waters for three months. When war broke out in April, 1861, the United States had nearly 2,400,000 tons of sailing shipping. There were only two American steam vessels in all the ocean-going trade, and the whole of her merchant shipping was of timber. With the advent of steam the proportion of the U.S. trade carried in American vessels had gone down from 81·7 per cent. in 1846 to 66·5 per cent. in 1860. The attempt to run steamers in competition with British lines had failed.

The decay of American shipping.

There are several points to note in connection with the oft-repeated assertion that the Alabama operations deprived the United States of her carrying trade. The first is the one just mentioned, that the value of the United States foreign commerce carried under

her own flag was dropping considerably before the war. The tonnage built was also dropping. The British tonnage in the United Kingdom's trade with the United States was steadily increasing before the war, and while it failed to maintain the rate of increase during the war, it went up by leaps and bounds after peace had been made. The American shipping employed in the foreign trade, on the other hand, continued to decrease after the war was finished, and its rapid decay began about the year 1878. It was in the year 1878 that the compound engine and surface condenser were introduced, leading to an immense step forward in steam shipping, where we were as pre-eminent as the United States had formerly been in sailing shipping. The percentage excess of American over foreign shipping in the entrances and clearances of the United States was greatest in 1826, when the excess was over 1100 per cent. From that year it went down, and if plotted in a curve it will be impossible to detect any violent fluctuation in the downward curve during the Civil War. It is evident that the decay of American shipping was not due to the war, but to a natural process which gave the advantage of shipbuilding formerly possessed by a timber producing country to one well ahead in working in machinery and iron. In 1855 Lloyd's had issued their first regulations for the construction of iron ships. In 1860, when the British Government announced that they would allow the mails to be carried in iron vessels, 30 per cent. of the vessels building for the British register were of iron. They were far cheaper to build in England than the United States, whereas better timber ships at £12 per ton could be built in the United States than could be obtained in England at £18 per ton. The causes, then, of the decay of American shipping were economic, and were not due to war. Fresh evidence on this head is afforded by the Spanish-American War of 1898, for the Spanish mercantile marine, which was laid up during the war, has grown since peace was signed to a greater prosperity than it had ever enjoyed before. The inference may fairly be drawn that a transfer of shipping to neutral flags, for the purpose of avoiding the risks of war, is not undesirable, except when the ships are wanted for government purposes.

CARLYON BELLAIRS.

CHAPTER VIII.

The Reorganisation of the Personnel.

The large character of the reorganisation.

When the *Naval Annual* was published last year the new scheme of naval training had but recently been introduced, and few steps had been taken to give effect to it. In the twelve months which have since elapsed the arrangements have been carried much further, and some of them are in full operation. It is now known that the famous Memorandum of Lord Selborne, which appeared on Christmas Day, 1902, had reference only to one part of a larger scheme of reorganisation, of which it is believed not the whole has yet been disclosed. It is a reorganisation which affects the *personnel* of the fleet in every rank and rating, and in pursuance of it changes have already been made which must have a very far-reaching influence upon the future efficiency of the Navy for its duties in war. The great discussion which was raised when the new scheme of naval training was propounded showed that two schools of thought existed in relation to it, and that, while in the Press the plan was as a rule acclaimed as sagacious and sound, there existed in the service a strong, though perhaps not preponderating, body of opinion, holding that in certain respects, and particularly in regard to the vexed question of amalgamation, the arrangements would have to be modified. It cannot be said that during the year anything has occurred to confirm either view, though the smoothness with which some of the new measures have been initiated seems to confirm the belief of those who have confidence in them, that the reorganisation of naval training will effect the object desired, and will increase to a large degree the general efficiency of the officers and men of the fleet.

The changes in progress, so far as they effect training, are based upon the view that the prime functions of the old sea officer passed away with the vast material changes affecting the life and character of the Navy, since all his efforts were directed to efficiency in sail power, and the internal discipline and economy of ships of war was framed in accordance with that necessity, whereas now every operation on board is executed and controlled by steam, hydraulic, or electric forces. There came with the recognition of this fact the belief that the demands upon the officer must in the future be greater than in the past, that his energies must be directed to much more complex business, and that his physical qualities will be subjected

to a far more searching test, and, consequently, that younger officers will be required to execute naval duties.

Changes at the Admiralty.

It is not the purpose to describe here the character of the new arrangements from a special point of view, though some of the changes will commend themselves, but rather to indicate how wide is their range and the general line they are taking, while recording some of the more important alterations which have been introduced. The thoroughness of the reorganisation in progress is exemplified by the fact that the Admiralty itself had undergone changes intended to fit it more completely to conduct its work of preparing and organising for war. The duties of the members of the Board have been reconsidered, and there is a partial redistribution of them, giving to each member a definite sphere of work. The general scope of this modification is explained by Lord Selborne in this statement explanatory of the Navy Estimates. The Senior Naval Lord is responsible for naval policy, the distribution and organisation of the Fleet, its discipline in a general sense, and its efficiency; the Second Naval Lord for the *personnel;* the Comptroller for the *matériel;* the Junior Naval Lord for stores and transport; the Civil Lord for the Works Department*; and the Financial Secretary for finance; while the staffs of the Naval Intelligence Department and the Naval Ordnance Department have been strengthened. By these and other changes the internal administration of the Admiralty has been in many respects improved.

Younger flag officers, and accelerated promotion.

A further step in the same direction of fitting the Fleet for war was embodied in an Order in Council based upon the report of Lord Goschen's Committee. Its purpose is to increase the flow of promotion, to bring younger officers on to the flag list, and finally to open opportunities for the younger men in the service to rise more rapidly than heretofore. Some details of these changes are given in Lord Selborne's memorandum. Modified selection has been introduced, not by a direct method, but by a system of non-employment in the case of officers who may be considered on any ground unsuitable to be employed. The good of the service is the only question to be considered, and the Admiralty are convinced that that good will best be served by bringing up the younger men. Officers, therefore, who have not been employed for a certain number of years will be retired under particular rules, which it is unnecessary to repeat in this place. Generally, in the case of admirals, the period is five years, in the case of rear-admirals three and a half years, and of captains and officers of lower rank three years. The

* The placing of the Works Department under the Civil Lord has probably contributed to the largely increased expenditure under this head.—Ed.

number of officers on the flag list is fixed at 92. Moreover, there are improvements in the scale of retired pay for captains which may induce some of those whose promise is not great in the service to retire. The number of captains is to be 253, and of commanders 373, and the periodical additions having been accelerated, the establishment of captains will be complete by the end of 1907. The result of these changes will be that lieutenants and commanders who, through exceptional merit, receive early promotion, will, when they pass to the flag list, form a constant and larger proportion of younger flag officers than are at present to be found there. It is obvious that in the course of time the promotion of officers of every rank will be affected. It is also pointed out that the Admiralty Board possesses a power which has remained in abeyance of conferring upon any naval officer temporary or local rank.

War training.

Coupled with this matter is the provision of a school of strategy and tactics for the higher ranks of officers. The war course at Greenwich continues with increasing value, and a short course has been established for flag officers, which is the beginning of greater things. At Portsmouth steps have been taken in the direction of providing bungalows at Whale Island whereby the building of the college in the Dockyard may become available for the creation of a War College.

The entry of cadets.

Turning now to the arrangements made for the education of officers and the entering of cadets, it may be said that work under the new system has now fairly begun. The buildings at Osborne accommodate about 80 youths, and the rapidity with which they were made available reflects the greatest credit upon all who were concerned. So large is the number of those wishing to enter their sons for the service, that the arrangement intended to permit parents to specify the particular branch which they wished the boys to join has become in practice inoperative. A boy entered with such an indication would, it is believed, have very little chance of being accepted when so many are anxious to secure places such as the Admiralty may find for them in the new conditions. The youthful age of entry has been severely criticised in many quarters. The principle upon which the Admiralty has acted is based upon the necessity of bending a youth's mind, in the most formative period of life, to the work of his future career and with regard also to the immense amount of knowledge which the boy must acquire. Youths from public schools had not shown much inclination for the service and it therefore seemed unnecessary to take them into account. The boys are selected upon nomination by a Committee appointed to interview them. The first committee met in June, 1903, seeing 279

candidates, and the second in November, 1903, seeing 150. The committee at the first examination expressed the very decided opinion that a more satisfactory or efficacious scheme of sifting the candidates could not have been devised, because it involved such an inquiry into all the points of fitness for the Navy as no form of stereotyped competitive examination would admit of, and the First Lord added that the experiment, though somewhat bold, might be regarded as completely successful. The report of the second committee also made it clear that the method of selection had commended itself as satisfactory to those who had had experience of its working; and the First Lord remarked that the success of the system was fairly established.

Osborne and Britannia Colleges.

In regard to the method of selection the Director of Naval Education prefixed a memorandum to the reports of the committee, as published, in which he said: "As an aid in selecting boys for entry to the College at Osborne under the new scheme of naval training, the First Lord appointed a small committee to see the candidates individually, and to put them through a very informal examination or inspection. This committee classified the boys according to its impression of their brightness and general suitability, and reported the classification to the First Lord, who then proceeded to make his nominations. The nominated candidates were next examined medically, and were finally subjected to a written examination on school subjects." It is impossible to admit all candidates nominated, but those rejected lose nothing, since it is enforced that there should be no distinction between the school work of the Navy candidate and that of the boy who wishes to go on to a public school. Mr. C. E. Ashford, of the Educational Staff at Osborne, insists that the necessary complement to this system of interview and qualifying examination is the recognition of the principle that all cadets are on probation, and that those who are found unsuitable must be eliminated. Not much wastage is anticipated from this cause. In accordance with recommendations received, it has been decided that the age at which applicants shall henceforth be invited to appear before the Committee, and be considered for nomination, shall be slightly raised. The advisability of this was urged in the *Naval Annual* of last year. The boys trained at Osborne and at the Britannia College, Dartmouth, will have every physical and educational advantage which could be obtained at any public or private school. The system of education is based upon the union of theory with practice, and mathematics and physical science occupy a large place in it. The boys make early acquaintance with work in the machine and fitting shops, and those erected at Osborne

are supplied with every appliance that can be required for such training—all the machinery being driven by electric power—while the work is conducted by a very experienced officer.

During the year 1903, therefore, much progress was made towards putting the new scheme into operation, but, of course, a period must elapse in which the old and new will run together, and arrangements have been made for the concurrent working of the two systems. The exact relation between the Osborne and Britannia Colleges appears not to have been settled definitely, but the latter is to have mechanical shops analogous to those at the former. It is thus intended to give the youths such a knowledge of mechanics as will fit them later on to take their part in the engine-room. Meanwhile, further steps have been taken to improve the general training of engineer cadets, and the course of studies at the Keyham College has been revised.

Sea training of cadets and midshipmen, gymnastics, etc.

Reference must now be made to the sea-training of cadets and midshipmen. Experience has proved that the work in the Isis and Aurora, specially commissioned as sea-going vessels for the cadets of the Britannia in the last term of their training, has been extraordinarily successful, and it has been arranged that the boys shall pass first to a seagoing training-ship and then to a ship in ordinary commission. Training under masts and sails having disappeared, a splendid system of gymnastics replaces it, so far as it can be replaced by the means now available, and lieutenants are appointed, as they have been in the past to the Britannia, partly with regard to their interest in gymnastics and exercises, and their proficiency in boat sailing. Such lieutenants become the patterns for their boys; they go to sea with them in the training-ships, and thus the spirit of seamanship is induced and fostered. Inasmuch as the scheme has not yet reached the stage of full development, it will be enough to say that the intention is that the midshipmen, when they leave the training establishment, shall go to sea and pass through a three years' course, with instruction in mechanics, applied science, marine engineering, seamanship, pilotage, gunnery and torpedo work, with qualifying examinations, the captains of ships being responsible for their training, which will be conducted by the lieutenants.

Specialisation in gunnery and torpedo for officers.

It is unnecessary to go into the disputed question of the amalgamation of branches, which Lord Selborne hopes may ultimately be brought about. The principle upon which the Admiralty is acting is that the same degree of ascendency in the profession is not necessary in every officer, and that there are diversities of talent and degrees of training, and it is the intention, in regard to every particular branch, to classify the specialised officers in three degrees of

knowledge or merit, and to employ them in relation to their individual efficiency, while tending to a higher specialisation. With this view the gunnery course has been rearranged, the time spent in qualifying and re-qualifying has been shortened, and a new classification of gunnery officers has been introduced. The grades have been re-arranged in the three classes indicated, of which the highest only will receive the most scientific training, while the instruction of the other grades will be mainly practical. This arrangement is in consonance with the general principle of the new educational scheme that, while it is necessary to have officers fitted for the highest positions, it is even more essential that there should be a large body of officers experienced in all duties, and possessing a sufficient knowledge of special branches. Specialisation in torpedo work has received attention upon a similar plan, and a scheme of instruction has been drawn up for the future lieutenants (E).

In another direction, but one intimately related to that just described, an advance has been made in regard to the officers of the Royal Marines, whose services are now utilised to a far greater extent in general work afloat than was formerly the case. These various changes, as they affect the training and work of young officers, have been outlined in various circulars issued in connection with the training of lieutenants, sub-lieutenants and cadets in shore establishments, the employment of officers of Royal Marines, alterations in the rank of engineer officers, and the employment of sub-lieutenants and midshipmen afloat.

Navigating officers.

The training of navigating officers has been revised, it having been recognised that a higher degree of efficiency is desirable, and that the navigating officer must be available for general duties. Changes have, therefore, been introduced in the selection, training, and advancement of these officers, and the Mercury has been set apart as a Navigation School Ship at Portsmouth, with a staff of instructors, and is intended to hold a position similar to that of the Gunnery and Torpedo Schools. All officers who wish to specialise in navigation will pass through this school, and lieutenants (N) will return to requalify from time to time. A distinction is established between junior navigators and those qualified to navigate a first-class ship. After three years' service as navigator every such navigator will study for a month in the navigation school, and will then be examined for the final task in pilotage. During his service in seagoing ships the lieutenant (N) will share in the ship's duties, and when at home in the reserves will undergo courses in gunnery and torpedo. The navigation branch will thus greatly benefit, and will assume that position in the service to which its importance entitles

it. The broad principle involved in these changes is in consonance with the plan of equalising the position of the several specialists.

Medical officers.

Great changes have also been made within recent years for the advantage of the Medical Department of the Navy. Many improvements were made in and subsequent to the year 1898, including the creation of a Consultative Board to bring the Navy into touch with the medical profession outside the service, the providing of special instruction in the diseases of foreign stations, and the institution of special wards for the study of them at Haslar. The examination for the entry of surgeons has been remodelled and the staff of examiners increased. Greater facilities and inducements are now offered to the resident medical and surgical officers of the larger civil hospitals to enter the Navy on completion of a term of service in their appointments, counting their civil service up to one year for seniority. Earlier promotion to the rank of staff surgeon is also granted to surgeons who have before entry held similar civil appointments, and one year's seniority may be so gained. The Inspectors-General and Deputy-Inspectors-General have been increased from sixteen to nineteen. Staff surgeons may now become Fleet surgeons after sixteen instead of twenty years from the date of entering the service, and surgeons may become staff surgeons after eight years from entry. Again, the period of service required for surgeons before undergoing examination for promotion has been reduced from eight to five years. At the same time, there have been substantial increases in pay and allowances. Further, to promote the flow of promotion and facilitate the retirement of officers, the period of non-service, after which retirement is compulsory, has been reduced to three years' non-employment in any one rank, and four years' continuous non-employment in any two ranks. More recently a scheme has been adopted by which young surgeons, who may not desire to enter the Navy permanently, may join for four or five years, at the end of which they may leave with a substantial gratuity or continue in the service at the discretion of the Admiralty. Cabin facilities are given, and there are other advantages which it is unnecessary to specify, all intended to place the medical service upon a better footing. Members of Queen Alexandra's Royal Naval Nursing Service share in the improvement in pay, allowances, and leave. An auxiliary royal naval sick berth staff has been formed by the enrolment of men of the St. John's Ambulance brigade and other qualified persons.

Accountant Officers.

Considerable improvements have been made in the situation of Accountant Officers of the Navy. The assistant-paymaster, who ranked with the sub-lieutenant until he attained six years' seniority, has now relative rank with the lieutenant after four years, and the

disqualification implied by the term "with but after" has been removed, the date of commission ruling the seniority. There is earlier promotion to the higher rank of staff and fleet paymaster, a paymaster becoming staff paymaster after four years instead of six, and fleet paymaster after another four years instead of six, thus gaining in the two ranks an advantage of four years. A new rank of paymaster-in-chief on the active list, with the relative rank of captain, has also been instituted, and a qualifying period for promotion to this rank has been laid down. Six fleet paymasters were recently promoted, and six more will be promoted during the year to this new rank. Moreover, special promotion has been recently instituted for meritorious officers, and the accountant branch has recently been added to the list eligible for consideration for the Order of the Bath (Military Division). In regard to the training of accountant officers, arrangements have been made for courses of instruction in the inspection of meat to be held at Smithfield Meat Market, and also for instruction at the Royal Victoria Yard, Deptford, where clothing for the Navy is received and examined, and provisions received, examined, and packed for shipment for the Fleet.

Chaplains.

There has also been some change in the Chaplains' branch, analogous to that in the case of the medical officers entered for limited service. Chaplains may now enter the Navy for a short period of from four to six years, receiving chaplain's pay, and leaving the service with a gratuity in proportion to the number of years they have served. The Chaplain of the Fleet has also been made an archdeacon, which it appears brings the chaplains under the episcopal organisation of the Church of England.

The new scheme as it affects the lower deck.

Some account may now be given of a very important part of the naval reorganisation, which was somewhat strangely overlooked when the new scheme of training was announced. It was assumed that the fresh arrangements concerned officers only, but the fact is that the career of the men is affected quite as profoundly. Lord Selborne in his memorandum explaining the scheme admitted that a great responsibility rested on the Board of Admiralty to see that, as the circumstances of the times changed, the careers of the men should be widened, their opportunities increased, and their training as fully adapted to their duties as that of officers. The principles laid down are that the abolition of the masted training squadron involved that of the old system of training, and that the training of men must undergo such a transformation as will fit them for the work of modern warships. Therefore the system for boys and men is being altered on the same principles as in the case of officers, useless knowledge being eliminated, and instruction being given, not only in ordinary

seamanship, gunnery, and torpedo work, but in the use of tools, with mechanics, and in the work of the engine-room and stokehold.

Gunnery and mechanical training for boys.

During the year various changes have been settled in accordance with the detailed proposals of the original scheme. In the training of boys all drill with arms is done as first-class boys, and boys of that rating are to have a course of three months' gunnery training, as well as five weeks of mechanical work and six weeks in a sea-going training ship. The utmost importance is attached to gunnery and to the training of boys in such a way as to make an interchange of duties between the deck and the engine-room and stokehold possible. Under the present arrangement, in which the engine-room complement is nearly always insufficient for continuous high-speed steaming, deck hands are drafted for assistance; but their inexperience does not make them the useful auxiliaries they should be. This defect is now expected to disappear, and the preparation begins with the training of boys, which is carried out in the stationary training establishments, the Isis, Medea, and Medusa being detached for sea-going work as tenders. The changes, first introduced in the Portsmouth command, coincided with the completion of the new naval barracks, and physical and gymnastic training on the Swedish principle, both in the barracks and afloat, is provided in substitution for sail drill, and is conducted under properly qualified officers and instructors.

The training of seamen.

The system employed for boys is continued and extended when they become ordinary seamen. They are then instructed in the use of mechanical tools, in the working of watertight doors, sluices, valves, fire mains, etc., and in stokehold work, bunker-trimming, firing, clearing fires, and stoking for water-tube boilers, etc. A considerable degree of proficiency in these matters has been made a compulsory qualification for the rating of A.B., and orders have been issued for the carrying out of the special training in ships in commission. Much greater importance, however, is attached to gunnery and torpedo work, and the new system has been introduced in the gunnery and torpedo schools, as also in the naval barracks at the home ports, and the courses have been laid down through which the men must pass. These have for their purpose to select and train them according to their abilities, the higher ratings being intended for the special schools upon proof of proficiency and the recommendation of their captains, while the training of the less capable will be conducted partly in the ships and barracks. Here there will be musketry courses, and those who qualify will be sent to the gunnery schools, through which all will pass for longer or shorter courses in turn. The arrangements provide for a complete training, testing, and selection of the men. Those who pass for captains of guns and

captains of turrets remain for longer training, and may be drafted for further work to ships in commission. There is encouragement for the better class of men in all these arrangements—which are applicable both to gunnery and torpedo—and new rates of allowances have been introduced with the object of improving the position of the more highly skilled gunners and the best shots. The result is to induce a greater spirit of keenness in gunnery and torpedo work, and the improved shooting of the Fleet has direct relation to these arrangements.

New artificer ratings and ranks.

An important step has been taken, which has special significance in view of the new system of training officers, in entering boy artificers, who are expected to provide a valuable class of men for the Fleet. It has been suggested that they are likely to grow up imbued with its spirit and traditions, and not to be subject to those outside influences which have contributed under the old system to introduce a certain tone of discontent into the artificer ratings. The Bellerophon and Temeraire have been converted into floating factories, renamed respectively Indus II and Indus III, and are to be moored with the Indus I in the Hamoaze at Devonport, with the purpose of giving effect to the new system of training, and providing accommodation for 200 boy artificers. Not less significant is the institution of the new rank of chief artificer-engineer, to which a number of promotions have been made, and which gratifies the ambitions of the artificer ratings by providing a channel through which they may hope to secure advancement to commissioned rank.

Promotion from warrant to commissioned rank.

Lord Selborne justified his statement that it was the duty of the Admiralty to provide for the widening of the careers and increasing the opportunities of the men by giving promotion to a number of warrant officers to the rank of lieutenant R.N. In this way a proportion of eligible chief gunners, chief boatswains, chief signal boatswains, and chief carpenters have been given the lieutenant's stripes, and several chief artificer-engineers are to be promoted in the same way to engineer-lieutenants, the pace of advancement promising to be very rapid. Two chief artificer-engineers were so promoted on April 1st. The chief artificer-engineers are to be increased to 60 or 70, and the artificer engineers to about 600.

Other changes.

Many other alterations have been introduced in order to improve the training and enlarge the opportunities of the lower deck, including better pay for the signal ratings, in order to encourage a larger number of men to qualify for the higher standard in signalling, with successful results, and the institution of the ratings of mechanician, yeoman of stores, and engineer's writer, which are intended to provide a valuable adjunct to the engine-room staff.

Non-continuous service ratings.

A very important change in the principle of manning the Fleet has been introduced in accordance with the recommendation of Sir Edward Grey's Committee. Lord Selborne, in the House of Lords on March 8th, said he cordially agreed with Lord Brassey that there must be a limit to the number of men in the permanent force, and the decision to enter 1,000 non-continuous service seamen and stokers experimentally is a recognition of the fact that not all the work on board ships of war—*e.g.*, ammunition supply—requires training from boyhood, which has been constantly urged for many years in the *Naval Annual*. The Admiralty, by boldly accepting the principle of a classification of ratings according to the ability of the men, found no difficulty in admitting a class from whom only duties of an ordinary, and, in a certain sense, humble kind are expected. Nevertheless, the reports upon these new non-continuous service men are satisfactory, and the plan is likely to be extended.

Naval Reserves.

No change has been made in relation to the Royal Naval Reserve, except in the institution of certain new ratings and the establishment of the rank of Commander R.N.R. Lord Selborne's memorandum shows that the Reserve is in a generally satisfactory state. The most important feature is the creation of the Newfoundland corps, which is to be increased to a strength of 600. The Fleet Reserve now numbers about 10,500, and is in a very satisfactory state. The Royal Naval Volunteer Reserve, though young, has made rapid progress, and divisions have been formed in London, with a company attached at Brighton and Hove, and on the Clyde, and other divisions are being instituted on the Mersey and the Tay, as well as companies in many other places.

JOHN LEYLAND.

CHAPTER IX.

The Japanese Navy.

To many nations the possession of sea-power would seem to be an unnecessary luxury, to others hardly a necessity; but to a few it must be acknowledged as the essence of their existence, without which they must retire into the obscurity of a second-rate South American Republic, or be entirely absorbed in the reaching grasp of an ambitious and foreseeing neighbour. Great Britain and Japan are perhaps the only two Powers of which it can truly be said that sea-power is the essence of their existence, and if this fact has not been acknowledged by the world with regard to Japan, it cannot be contended that she herself has not, during the last decade, realised it to the full. The world's history can hardly be said to contain a parallel case to that of the present Japanese Empire, which from comparative obscurity has grown, in scarcely thirty years, into the controlling factor of the Far Eastern question, curbing the unlimited desire of the Great Muscovite Empire, and turning the once easily beguiled and effete Manchu Dynasty into a Power whose effective neutrality dominates the situation.

Strategic position and early history.

The history of Japan is a history of internecine struggle, a nation fighting against itself, but presenting an unbroken front against the would-be invader, and it can truly be said of Japan that no conqueror has ever effectively held an inch of the native land. On the other hand Japan has, on many notable occasions, taken the war into the enemy's country, and it is significant that Corea has frequently been the chosen battle ground. Corea has from the earliest times been a constant source of anxiety to Japan, as from her weakness always liable to be absorbed by a foreign Power, and thus becoming a real foe at her very doors. In later years it has been recognised that Corea is a necessity to the Japanese Empire as a home for its overflowing population and a natural granary for the food supply of the empire itself. This alone is a sufficient reason for maintaining a

Fleet, while the rapid expansion of Japanese commerce,* and the still more rapid growth of her mercantile marine, have only been possible under the sense of security engendered by a Fleet capable of securing not only the control of the Corean Strait, but the trade routes traversing the North China and Japan Seas and the Pacific Ocean.

Japan's ambition, which she has for thirty years endeavoured to attain by the building and equipping of a powerful fleet, backed by a large and mobile army, is therefore firstly the protection of her shores, in order that her internal resources and manufactures may be developed to the full; secondly, the integrity of Corea; and thirdly, the security of her merchant fleet in the Eastern Seas and freedom of trade with all the world. A strong Chinese Empire, capable of resisting encroachments of the ever-advancing nations of the West, has in latter years been undoubtedly a prominent factor in governing the military policy of Japan, and this she hopes to attain by re-organising the Chinese land forces in the North, whilst securing with her Fleet the lines of communication traversing the Yellow Sea and the Gulf of Pechili.

Early history.

The Japanese Imperial Navy can only be said to exist as an effective organised force since about 1872. In ancient times, however, the fleets of the emperors and shoguns were often organised to transport an army on an expedition of retaliation or conquest, and it is recorded that as far back as A.D. 200 a large fleet transported the so-called Empress Jingo to Corea. The peninsular was conquered and occupied for many years, an exploit repeated by Hideyoshi at the end of the sixteenth century.

In the ninth century a determined attack by Corean pirates with forty-five vessels on Tsushima was repulsed with great loss of life and ships, but the might of the ancient Japanese on the sea was perhaps at its highest in the twelfth and thirteenth centuries, when the power of the Shogun Yoritomo was finally established by a great naval battle near Shimoneseki. He and his successors did not content themselves with repelling the raids of the northern nations on the shores of Japan, but took the war into the enemy's country and made the Japanese fleets a terror to the Corean and Chinese pirates. Towards the end of the thirteenth century, however, the Japanese seem to have lost the command of the Yellow Sea, for the Mongols and Coreans were able to cross it and to attack Japan with a fleet carrying an army of 100,000 men. The Japanese ships, however, though

* The following approximate figures indicate the rapid growth of Japan's foreign trade:—Exports and Imports 1892 = £16,000,000; in 1902 = £53,000,000. The shipping entered at Japanese ports in 1902 totalled 11½ million tons, of which nearly 40 per cent was under the Japanese flag. The Nippon Yusen Kaisha alone own 78 steamers of 250,000 tons.

small, were well manned, and when they were sunk the crews swam on board the larger Mongolians and captured many. A gale finally dispersed and destroyed the Mongol fleet, and it is stated that only three men returned to China.*

Shipbuilding in Japan has certainly been a staple industry ever since the reign of Sujin Tenno (B.C. 67), who issued an order calling attention to the importance of facilitating naval construction. Though prior to the seventeenth century large Japanese vessels had traded to the Straits Settlements and India, in the early years of that century ship construction progressed greatly under the direction of the famous Will Adams. But in 1621, the then Shogun, being alarmed by the emigration of Japanese to foreign lands, issued an order limiting the size of ships, and thus preventing ocean trade, and this decree effectually checked for two and a-half centuries the growth and expansion of both an Imperial Navy and a merchant fleet. Other causes also assisted in checking the development of an Imperial Navy, the chief of these being an absence of intercourse with the outside world, due to the intense suspicion and dislike of the European nations who first penetrated to Japan in 1542, and after carrying on an always insecure trade through the only port to which they were admitted—Nagasaki—were finally expelled in 1638. Between this year and 1854 no foreign ships were allowed into Japanese ports under any pretence whatever, but in the latter year the Shogun was compelled by Commodore Perry, of the United States Navy, to sign a treaty, which practically marks the opening of Japan to foreign intercourse, and the awakening of that ambition which has so rapidly brought her to such a powerful position in the Far East. The treaty with the United States was soon followed by treaties with the European nations and the opening of Kanagaiva (near Yokohama) to foreign trade. Much internal strife occurred, however, before the country really threw itself into commercial intercourse with, and competition in, the world's markets, and the dislike and suspicion of the foreigner were so great that embassies were sent to Europe and America with proposals tending to limit and check trade. The Japanese also showed a strong inclination to disregard the treaties, and the bombardment of Shimoneseki in 1864 by a combined foreign fleet was rendered necessary by a flagrant attack by the forts on trading vessels. The final overthrow of the Shogunate, and the restoration to power of the Emperor in 1868, mark a point from which Japan commenced a real organisation of her land and sea forces and

Shipbuilding in Japan.

* The writer is indebted to Reed's excellent work, "Japan," for many of the historical incidents herein referred to.

a rapid development of her internal resources and of her oversea trade.

Growth of Imperial Navy.

In 1858, when Lord Elgin, on behalf of Queen Victoria, presented the Shogun with a steam yacht, the Japanese Navy consisted of one paddle steamer and three sailing vessels. The bombardment of Kagoshima, in 1863, by a British squadron, under Admiral Kuper, was no doubt the cause of an expedition to Holland by Admiral Kamurigo, who returned four years later with a new Dutch-built ship, the Kaiyo Maru. The Admiral joined the cause of the expiring party of the Shogun, and, taking the fugitive rebel chief on board, proceeded to Hakodate, which was captured. The Kaiyo Maru was, however, subsequently wrecked by a gale, and an Imperial squadron defeated and destroyed the other insurgent ships.

The Emperor and his ministers now started to reorganise the Army and Navy, and to open up and develop the country in accordance with European ideas, the Navy being modelled on British lines, under the superintendence of the present Admiral Sir Archibald (then Commander) Douglas, with a staff of officers and men of the British Navy. A naval college was opened at Tsukiji and Tokyo. Japanese officers were afterwards sent to sea in British ships to get practical experience. The college has since been transferred to Etajima, near Kure, but the old building at Tsukiji remains, and is now the naval club. British officers also assisted the Emperor's hydrographer in surveying the coasts and harbours, and preparing the first of those Government charts which are now recognised as among the best in the world.

The development of the Army and Navy advanced so quickly that the Government were able, in 1874, to send a well-equipped punitive expedition to Formosa, under the command of General Saigo, afterwards Minister of Marine. Three years later the Navy took an active part in the suppression of the Satsuma rebellion, when squadrons under Admirals Kawamura and Ito (the Yalu victor) operated on the coasts of Kiushiu, and covered the landing of troops at Kagoshima.

War with China.

The strength and efficiency of the Navy were well shown in the war of 1894–5 with China, in which Japan first exhibited to the world the thorough and systematic organisation of her land and sea forces, and showed how quickly she had been able to profit by the experience of the Western nations in the arts of war. The Japanese in this war exhibited not only good tactics, strategy, and splendid organisation, but also showed that the *personnel* of the Army and of the Fleet was composed of men of great dash and courage with a

TABULAR STATEMENT showing the growth of the Japanese Navy and comparison with Russian Fleet in the Far East, February 8, 1904.

Year.	Battleships.		Cruisers.		3rd Class, 18 kts.	Slower effective ships.	Torpedo and Anti-Torpedo Craft.		Building (not including Torpedo Craft).	*Personnel* (Total). Active List.	Remarks.
	1st Class.	Other.	1st Class.	2nd Class, 3000 tons, 18 knots.			Torpedo-gunboats and T. B. D.'s.	Torpedo-boats, Sea-going.			
1889	..	1	..	3	1	7	..	5	3 2nd cl. cruisers, 1 3rd cl. cruiser	9,800	
1895	..	3	..	5	3	10	2	21*	2 battleships, 1 3rd cl. cruiser	16,500	After war with China.
1900	5	1	2 armoured	7	4	11	10	22	1 battleship, 4 armoured cruisers, 1 3rd cl. cruiser	24,000	
1904	6	1	8 armoured	9	7	15	20	41	1 3rd cl. cruiser	28,000 (estimated)	
Russia. In Far East, Feb., 1904.	7	..	4 armoured, 5 protected	2	2	..	27	10	..	..	Volunteer Fleet cruisers are shown as 3rd class cruisers.
Russia. On passage out	1	..	1 protected	..	..	1	7	4	..	..	

* Includes 18 boats now rated as 2nd Class.

TRADE AND OTHER STATISTICS, JAPAN.

	£
Revenue, 1903–4	25,000,000
Expenditure, 1903–4	25,000,000
Public Debt	56,000,000
Exports, 1902	26,000,000
Imports, 1902	27,000,000

	£
Exports of coal (3,000,000 tons)	1,700,000
" copper	1,000,000
" other metals	3,000,000
" oil	2,500,000

			No.	Tonnage.
Shipping entered, 1902.	Steamers	Japan	3,226 =	4,309,000
		Foreign	2,985 =	7,090,000
		Total	6,211 =	11,399,000
	Sailing vessels		1,553 =	175,000

Commercial Docks	Over 400 feet	8
	Under 400 feet	17

high sense of devotion to their country and their Emperor. The war, which was brought to a close by the treaty of peace signed at Shimoneseki on the 17th April, 1895, is still fresh in our minds, and does not require recapitulation here, the torpedo boat attack on the Chinese ships at Wei-Hai-Wei being alone sufficient to show the fine qualities of the *personnel* of the Japanese Navy.

The lessons of the war were not lost on the Japanese nation. It at once embarked on a naval and military programme, extending over ten years, and involving an outlay of £34,000,000, which, considering the relative revenues of the two countries, is approximately equivalent to what a sum five times as large would be to Great Britain. It must also be remembered that the greater part of the money voted for naval construction had to be spent out of the country, whose shipbuilding resources are not even now sufficient to cope with ships of a greater size than a second-class cruiser.

Russia and Port Arthur.

The paramount importance of a strong Fleet was emphasized in 1898, when Russia, one of the Powers which forced Japan to give up Port Arthur, on the plea of endangering the integrity of China, calmly took possession of it herself; for it is obvious that the "lease" was a mere *façon de parler*, and that Russia intended to make Port Arthur the outpost of a continuous empire, embracing the whole of Manchuria. Japan under this trying ordeal showed a most praiseworthy self-restraint, but nevertheless pressed forward steadily the naval and military programme, the completion of which she believed would place her in a position to assert successfully her just rights in the Far East. Whilst for the last five years she has done everything that could, without loss of honour and the sacrifice of her paramount rights and interests, be done to avoid war, Japan has always realised that if not inevitable it was more than possible, and her naval and military forces have been kept in a high state of preparedness. The opening stages of the war which is now unfortunately in progress have shown that, when called upon, the Imperial forces were ready to strike, and to strike quickly.

Strategic position.

The natural resources of a country for equipping and maintaining a fleet must influence to a large extent its naval efficiency, and in this respect Japan, although not so well provided in some respects as England, has many great advantages over other countries. The coast, particularly at the most convenient strategical points, is studded with fine natural harbours, where the largest fleets can lie in security. The Inland Sea forms a fairly secure line of communication between

Japan's western and eastern shores, and the position of the Japan Islands is such that she can practically isolate and confine an enemy's operations to her southern and western coasts. In the case of the present war it is true that Russia could operate from both Port Arthur and Vladivostock, but the two forces are cut off from one another, and in order to combine would have to pass the Corea Tsugaru or La Perouse Straits, either of which operations would be very hazardous, the last being difficult even in peace time on account of the very strong currents and dense fogs which prevail almost continuously in the summer months. The Japanese Fleet on the other hand can concentrate quickly at any position and find always a secure anchorage in which it should be difficult if not impossible for an enemy's torpedo craft to discover and attack them.

Japan being, like Great Britain, an island empire, it is natural that her population should have instinctively taken to the sea and her communications with the remainder of the world being of necessity ocean-borne, the recent development of the country has resulted in an enormous expansion of her merchant fleet. Sea transport has always been more effective and cheaper than transport overland, and the Inland Sea no less than many good harbours of the coast is peculiarly adapted for developing the internal communications which have assisted so greatly in opening up the country to trade. In this sea Japan can quickly and in security embark the Army corps ready to move to the chosen points of debarcation, whilst her Fleet is free to deal with the enemy's naval forces.

Natural resources.

The principal raw material of naval construction—iron ore—is mined, notably along the "Tokaido" or "Eastern sea road" where there are large deposits of magnetic ore, and at Dōzan in Kikuchū on the north-east coast of Nippon.

Coal, the source of energy of the manufacturing and repairing base, and the vital food of a modern fleet, is produced in abundance, and although not of the best quality for a warship's furnaces, is nevertheless quite good enough to fall back on should the supply from outside be cut off. Japanese coal is used by nearly all coasting ships to the east of Singapore, by most of the ocean steamers which trade to these waters, and by the many large manufactories, arsenals, and shipyards in China and Japan. Its chief objection for use in a war vessel is the dense blackness of the smoke produced by it, especially with water-tube boilers. The best qualities are found in the Fubari mines in the Hokkaido (Yezo), and in Kiushiu in the Müke coalfields, that found in the latter being noted as highly bituminous with but a small percentage of ash. The output from the Müke mines alone is nearly

a million tons per annum. The total export of coal from Japan in 1902 was three million tons.*

Naval organisation.

The watchword of all the Japanese public departments is organisation, and in this respect the Navy is certainly not inferior to any in the world and is an object lesson to many. The Japanese Navy has the great advantages of having practically commenced its life at a time when older Navies were passing through a state of transition, and it has not been hampered by the deadweight of obsolete customs and institutions which are so difficult to throw off. In re-organising the Navy the Emperor's naval advisers wisely adopted only the good points in the naval administration, organisation, and equipments of other Fleets, and realised above all things the importance of maintaining a fleet ready in all respects to take the sea in fighting trim at the shortest notice.

The organisation of the Japanese Navy, and the responsibility of the various heads of departments is carefully explained and defined in an official gazette published in May, 1900, immediately following the grand naval manœuvres and imperial review held in that year. This decree proclaims the Emperor as head of the Imperial Navy, and directly responsible to him are the following five departments or offices:—

(*a*) Minister of Marine.

(*b*) Commanders-in-Chief of Fleets and Principal Naval Ports.

(*c*) Chief of the Naval General Staff.

(*d*) Board of Preparation for War (Naval).

(*e*) Board of National Defence.

The direct responsibility of the Commanders-in-Chief of Fleets and Naval Dockyards to the Emperor seems at first sight an arrangement likely to cause friction with the Minister of Marine, but as a matter of fact in practice it would seem to have worked well, the fact no doubt being that, although the Emperor holds these heads responsible to him for the efficiency of their commands, they receive their orders, and report to the Minister of Marine.

Minister of Marine.

The Minister of Marine must be a flag officer. He has the responsibility of the general administration of the Navy and issues all orders to the heads of departments. He also has the power of inspecting the dockyards and other naval establishments. This post is at present most capably filled in the person of Vice-Admiral Baron Yamamoto, an officer who can be trusted to keep the Navy in the highest state of efficiency.

Naval General Staff.

The Naval General Staff is the Intelligence Department of the Japanese Navy, prepares plans for action in war, and schemes for

* This figure does not include bunker coal supplied to vessels trading to Japan.

manœuvres, etc. It has much more power than the Intelligence Department of our Navy, as its chief is directly responsible to the Emperor, and this office has been for some time held by the veteran Admiral Viscount Ito, of Yalu fame, who is of course senior to the Minister of Marine. Viscount Ito has been the chief umpire at the naval manœuvres held in recent years.

Board of Preparation for War (Naval).

The Board of Preparation for War is composed of admirals, and its work is believed to be mainly of the deliberative order. It has no counterpart in our Navy, but its duties are probably much the same as would be those of our Admiralty Board, supposing that they were relieved of all executive and routine work, and were made responsible only for examining into and reporting on the general state of efficiency of the Navy for war.

Board of National Defence.

The Board of National Defence is a mixed board, composed of the Minister of the Navy, the Chief of the General Staff, and the heads of the two corresponding military departments. It no doubt arranges for joint naval and military action, and settles the responsibilities and duties of each in cases where any doubt might arise.

"Kaigun-Sho."

The "Kaigun-Sho" (literally, Warship Department), Navy Department, or Admiralty, presided over by the Minister of Marine, is divided into six sub-departments, each of which has a responsible head.

The Admiralty buildings are finely situated in the centre of Tokyo, the various departments being well arranged with complete telephonic communication, both internally and with all the Government offices.

General Service Department.

The Departments of the "Kaigun-Sho," are presided over by the Vice-Minister of Marine, an executive flag officer. This post is at present ably filled by Rear-Admiral M. Saito, who is well known to many officers in the British China Fleet, and speaks English with great fluency. He is one of the youngest admirals in the Japanese Fleet. The General Service Department is divided into numerous branches—construction, navigation, communication and transports, naval regulations, internal economy of ships, discipline, and naval uniforms.

Personnel Department.

The chief of the *Personnel* Department is also an executive flag officer, and has two captains under him, who are the heads of the officers' and seamen's branches respectively. The officers' branch deals with supply and promotion of officers, pay and pension, and records of service; and the seamen's branch with the corresponding questions with regard to the seamen.

Ordnance Department.

The Ordnance Department is also presided over by an executive flag officer, with two assistant captains and a large staff of officers, and is divided into the two branches of gunnery and torpedo.

Accountant and Medical Departments.

The Accountant and Medical Departments are presided over respectively by the Accountant-General and the Medical Director-General, who have non-executive flag rank. Each has two assistants of rank corresponding to post captains. The Accountant Department has branches which severally concern themselves with estimates, expenditure and accounts, and the entry and instruction of naval accountant officers, who are educated in a special school. The Medical Department has branches for medical service afloat, hospitals, medical stores, and entry and instruction of medical officers and staff in the Naval Medical School.

The medical organisation of the Navy is, like that of the Army, probably the best in the world, and the hospitals at the principal naval ports are models which might well be imitated, but cannot be excelled, in any country. A hospital ship is always attached to the large squadrons in manœuvres and at reviews.

Naval Law Department.

The Naval Law Department is the only Admiralty department presided over and manned by civilians. It deals with courts-martial, naval prisons, etc.

Boards and committees attached to the General Service Department.

Attached to the General Service Department of the Minister of Marine are various boards or committees, the principal of which are: the Committee of Admirals, the Naval Engineers Committee, the Naval Education Committee, the Board of Naval Control, and the Board of Naval Hydrography.

The Naval Education Committee controls the various Naval educational establishments—viz., the Naval Academy, Naval School, Naval Engineers' and Engine Room Artificers' Schools, and the Gunnery and Torpedo Schools.

The Board of Naval Control, of which the Controller-General is the head, is responsible for the general organisation and efficiency of the naval dockyards, gun factories, ammunition factories, etc., and for supervision over the supply, construction of ships, engines and war material. It forms a connecting link between these various establishments and ensures homogeneity in construction.

The above description will give a good idea of the careful organisation of the Japanese Navy Department, and the efficiency of the Fleet is a sufficient proof of its thoroughness. There are approximately 150 naval officers employed in the various Admiralty Departments, and all wear the undress uniform of their rank when on duty there.

Personnel.

The *personnel* of the Navy is perhaps better known in England than in any other country outside Japan, for the modern Japanese Fleet has, to a large extent, been constructed at British shipbuilding yards, and a large number of its officers have resided in our country

for the purpose of studying the organisation and equipment of the British Navy, making themselves practically acquainted with the shipbuilding, gun construction, armour-plate manufacture, etc., and learning the English language. A great many officers have also superintended the building of Japanese warships at our large private establishments, and navigating crews have been sent to England to bring these ships to the Far East when completed.

The officers are very eager and quick to learn, and can grasp at once the good points to be adopted, and the bad ones to be avoided; but perhaps their chief characteristics is intense devotion to their profession, in which all their interest seems to be wrapped up. The Japanese naval officer is as keen about, and as interested in, the exercises of peace, naval manœuvres, etc., as if at war, and feels intensely the praise or blame of his superiors, the latter of which is never withheld if deserved. The warrant officers, petty officers, and men are as good as can be found anywhere, and emulate their superiors in zeal and devotion to the service. They are a sturdy, well-built lot of men, very active and capable of great endurance.

Uniform.

The naval uniform is very similar to ours, but there are fewer varieties, the officers having only the full dress, frock coat and undress (blue and white) uniform. The undress uniform coat—a plain tunic with black braid rank distinction on the arm—is a neat and serviceable attire, and is very generally worn, notably by all officers serving at the Admiralty. The various branches are distinguished, as in our Navy, by coloured bands between the gold stripes on the sleeves for the non-executives, and the curl for the executives. The various executive ranks correspond closely to those in our Navy, but there is a recognised rank of Lieutenant-Commander, distinguished by three stripes, a Commander wearing three and a half. The non-executives have corresponding rank to the executive up to the rank of Vice-Admiral.

Entrance and training.

The executive officers enter the Navy by open competitive examination, and are educated at the naval school on the island of Etajima, in the Inland Sea, close to Kure, one of the principal naval ports. The competition for entry is very keen, there being from eight to ten candidates for each vacancy, the age being approximately eighteen at entry.

The Naval College is a very completely organised establishment with every appliance for the instruction of the cadets in the various subjects included in a curriculum embracing English, mathematics, pure and applied, chemistry and physics, navigation, seamanship, gunnery, torpedo, and steam. Attached to the school are boats and

tenders for the instruction of cadets in sailing, rowing, and handling boats, practical seamanship and navigation, and gun practice, and also a battery of various types of gun for drill purposes. The health of the cadets is carefully looked after, wrestling, fencing, and gymnastics being taught and games of all sorts encouraged. After passing out of the college, the young officer goes to sea in a sea-going training-ship as a midshipman for about a year, and after passing the necessary examination he is drafted to a ship in commission as a sub-lieutenant. The training ships were until lately obsolete masted craft, but now ships of more modern type are used, and in 1903 the Matsushima and her two sister ships were formed into a training squadron, and proceeded on an extended cruise to Australia.

Those officers who are selected from the Lieutenants' lists to qualify as specialists in gunnery and torpedo go through a very similar course to that obtaining, until 1903, in the British Navy, the theoretical part being gone through at the Naval Academy at Tokyo, and the practical at the gunnery or torpedo school at Yokosuka.

Engineer officers.

Engineer officers enter by examination at about the same age as the executives and are educated at the Naval Engineering School at Yokosuka, where they learn both the theoretical and practical parts of their profession, tenders of ships being attached to give them practical experience under way. The course occupies four years. There is a higher course at the Naval Academy, Tokyo, for engineer officers who are specially selected from sea-going ships to go through it.

Medical officers.

There are also special schools for the instruction of medical and accountant officers, who are entered by competitive examinations.

Advanced courses.

In addition to the executive officers going through the gunnery or torpedo course, and the engineer officers taking the advanced engineering course, there are given at the Tokyo Naval Academy lectures and instructions to officers of the higher ranks in tactics, naval history, etc.

Promotion of officers.

The method of promotion to all ranks in the executive branch is by pure selection, a minimum length of service in each rank being however laid down. In the lower ranks the promotion depends to a great extent on the result of examinations. The selection of captains for promotion to the flag list must, of course, be the occasion of much jealousy, as it often occurs that a very young captain is chosen over the heads of a great many of his seniors, but the result is that there is always available a good selection of young and capable admirals. The promotion in the other branches is by length of service in each rank qualified by examination.

The seamen, stokers, and artisans are obtained partly by volunteering and partly by conscription, the conscripts being entered, as may be necessary, to complete the authorised complement not filled by voluntary service men. The Navy is, however, a very popular service in Japan, and it is stated that the great majority of the men are volunteers, who engage for eight years' active service and four years in the reserve. The conscripts are kept for four years on active service and eight years in the reserve. The great majority of the men are from the seaports or towns, and have a natural aptitude for a sea life, most of them belonging to families connected with the coasting trade or employed in the fishing industry, which is a very large and important one. Seamen, stokers, and artisans' entry and training.

The men on entry are drafted to the nearest naval barracks, situated at the great naval dockyard ports, and equipped with every appliance for the preliminary instruction, which is a prelude to practical training in a sea-going ship. The gunnery and torpedo schools for the seamen are in connection with the barracks, and the course of instruction includes seamanship generally, boat pulling, field exercise, gunnery and torpedo. Tenders are attached to the barracks for practical training.

The men selected from sea-going ships to qualify for the higher gunnery and torpedo ratings are sent to the gunnery or torpedo schools at Yokosuka. Men who thus qualify, or who show good ability generally, are allowed to volunteer for further active service afloat, after their first period has expired.

The stoker ratings receive much the same preliminary instruction as in the British Navy, and, after a period of service afloat, a proportion who are specially selected, and who volunteer, are sent to the artisans' school at Yokosuka, where they receive a higher mechanical education to fit them to take their place as engine-room artificers in the Fleet, which therefore undertakes the entire technical education of its engine-room staff.

The Japanese Naval Reserve, which, as it has been explained, consists of men who have completed their period of service in the active list, is also recruited from the merchant fleet, whose rapidly increasing dimensions constitute a strong reserve for the Imperial Navy, not only of officers, but also of seamen, stokers, and artisans. It should, however, be remembered that a large percentage of the mercantile fleet is required for transports, colliers, and fleet auxiliaries in war time, so that it would be impossible to withdraw the crews from ships so employed. Reserve.

The pay and emoluments of officers and men in the Japanese Navy are very small in comparison with the ordinary rates to which Pay.

we are accustomed, but subsistence generally is cheap in Japan, and ideas as to the necessities of life and luxury are much simpler than those of the Western nations.

Matériel. The *matériel* of the Navy may be summed up under the headings of—

(*a*) Ships of all classes.
(*b*) Naval dockyards and repairing stations.
(*c*) Armaments and ammunition factories.
(*d*) Other shipbuilding resources.

Ships. The present Japanese Fleet is composed of ships of all the effective fighting classes, with the possible exception of the heavy unarmoured cruiser. This Fleet has to a great extent been constructed in England, and the ships, in their general characteristics of construction, disposition, and type of armament, internal arrangements, and external appearance, are very similar to their prototypes in the British Navy. As usual, however, the private contractor, with a much freer hand, has been able to introduce a heavier armament than that carried in a ship of corresponding displacement in our Navy, and at the same time give apparently equivalent qualities in other respects. This is particularly noticeable in the case of the armoured cruisers, of which Japan possesses six of practically the same type.

Kent and Tokiwa. Comparing the Tokiwa with the Kent we find that the displacement of the two is practically identical. The extra coal capacity of the Kent is made up for in weight by the excess of armour protection in the Tokiwa, which also carries the extra weight of two submerged torpedo tubes. The speeds on trial were practically the same, but although the Japanese is three years older than the British cruiser, she mounts four 8-in. guns, in addition to a secondary armament equivalent to the total armament of the latter. There can be no doubt that at the long range at which modern actions must be fought the superiority of the 8-in. guns over the 6-in. will be still further emphasised.

General construction and qualities. The casemate system has been adhered to for the mounting of the heavy Q.F. guns up to the time of the designing of Japan's newest battleship, the Mikasa, in which ten of the fourteen 6-in. quick-firers are placed in a main-deck battery protected by 6-in. Krupp armour; but the three battleships immediately preceding her have also two more 6-in. guns than their British contemporaries, and the extra guns being mounted in upper-deck casemates gives them a considerable advantage in bad weather.

It is not intended to examine exhaustively the qualities of the various types of ships which constitute the modern Japanese Navy,

as full information on this point is at the disposal of all, not only in the pages of this *Annual*, but in the books of reference which are now so plentiful. The various units of the modern fleet may, however, be summed up as follows :

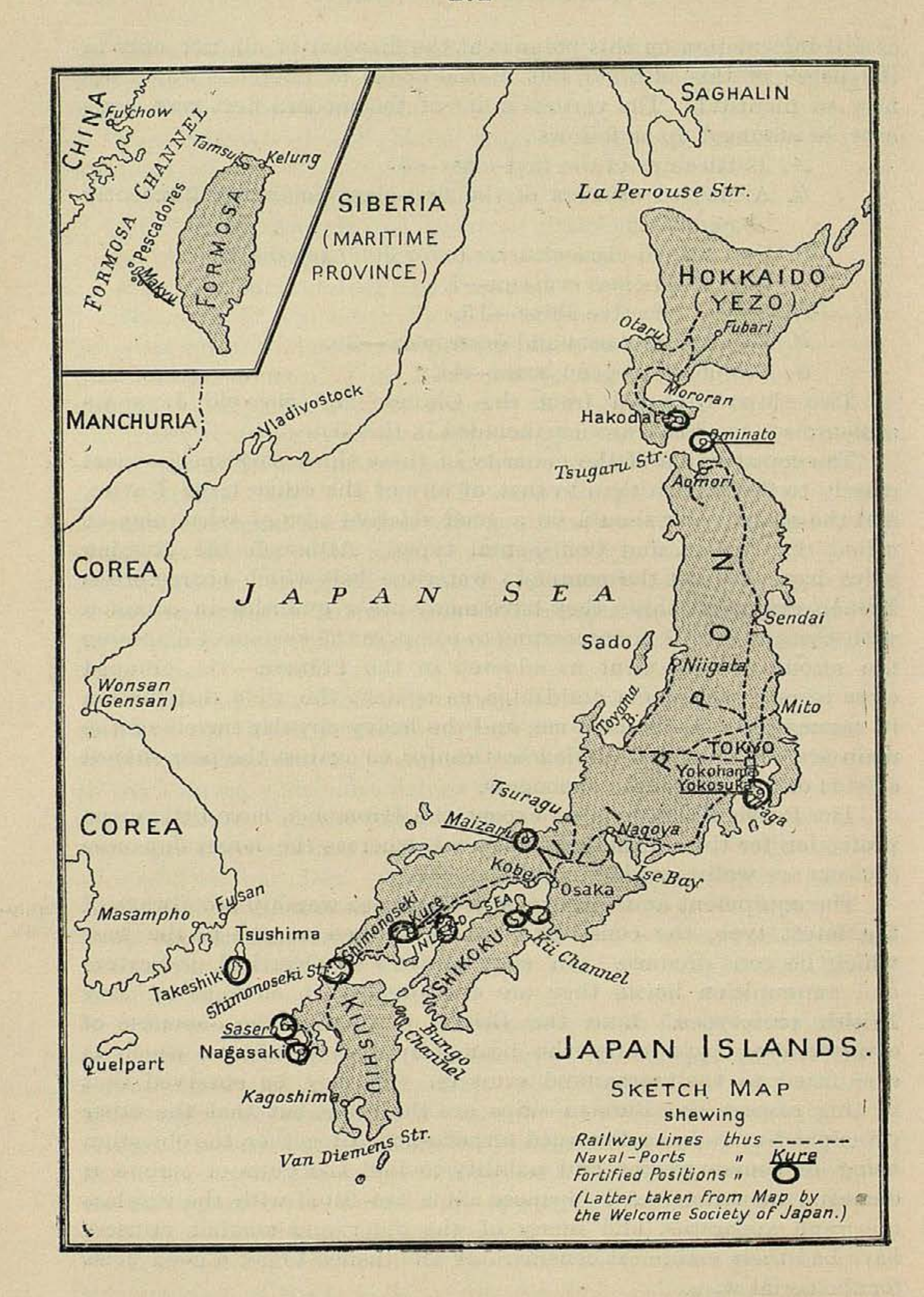
A. Battleships of the first-class—6.
B. Armoured cruisers of the first-class (including 2 recently bought)—8.
C. Fast second-class cruisers (over 3000 tons)—9.
D. Fast third-class cruisers—7.
E. Slower effective ships—15.
F. Torpedo gunboats and destroyers—20.
G. Sea-going torpedo boats—41.

Two ships captured from the Chinese and the old Japanese armourclad, the Fuso, are not included in this list.

The construction of the majority of these ships corresponds more closely to the British than to that of any of the other large Navies, and the present war should be a good relative test of what may be called the British and Continental types. Although the Russian ships have not got the complete waterline belt which characterises French armoured ships, they have many other qualities in common with them. It will be interesting to compare the system of disposing the secondary armament as adopted in the Poltava—viz., grouped close together in turrets amidships, as against the wide distribution in casemates of the Shikishima, and the heavy circular turrets of the main armament in the Russian battleships, as against the pear-shaped shields of their Japanese opponents.

The Russian cruisers also, except the Gromoboi, have little or no protection for their principal armament, whereas the larger Japanese cruisers are well provided in this respect.

The equipment and fittings of a Japanese warship are always of the latest type, the constructor being allowed to put in the best which he can produce. In such matters as electrical indicators and ammunition hoists they are considerably in advance of their British prototypes. Like the British battleships the Japanese of corresponding type carry the beam torpedo-net defence, which is also fitted to their armoured cruisers. It may be observed that in this respect the Russian ships are the same, but that the other principal Navies have discarded torpedo-nets altogether, the objection being of course weight and liability to foul the guns or screws if damaged in action. All Japanese ships are fitted with the wireless telegraph apparatus, and many of the older and smaller cruisers have had their mainmast considerably lengthened to get a good hoist for the aerial wire. Equipment.


CHINA
Fuchow
FORMOSA CHANNEL
Tamsui
Kelung
Pescadores
Makyu
FORMOSA
FORMOSA
SAGHALIN
SIBERIA
(MARITIME
PROVINCE)
La Perouse Str.
HOKKAIDO
(YEZO)
Otaru
Fubari
Mororan
Hakodate
Ominato
Tsugaru Str.
Aomori
MANCHURIA
Vladivostock
COREA
JAPAN SEA
NIPPON
Sendai
Sado
Niigata
Wonsan
(Gensan)
Toyama B.
Mito
TOKYO
Yokohama
Yokosuka
Uraga
Tsuragu
Maizaru
Nagoya
COREA
Kobe
Osaka
Ise Bay
Fusan
Masampho
Tsushima
Shimonoseki
Kure
INLAND SEA
SHIKOKU
Kii Channel
Takeshiki
Shimonoseki Str.
Sasebo
Nagasaki
Quelpart
KIUSHIU
Bungo Channel
Kagoshima
Van Diemens Str.
JAPAN ISLANDS.
SKETCH MAP
shewing
Railway Lines thus
Naval-Ports " Kure
Fortified Positions "
(Latter taken from Map by
the Welcome Society of Japan.)

The most noticeable point in a Japanese ship is an apparent absence of the small fittings which are liable gradually to creep into a navy during the prevalence of a long period of peace. The internal fittings of the cabins, officers' and men's messes, etc., are also very simple. The Japanese ship, in fact, is always in a state of preparation for war, and very little has to be done to get her ready to go into action.

The principal naval dockyards are at Yokosuka, Sasebo, Maizaru, and Kure, all of which are shown on the sketch facing this page, as are also the naval ports of Ominato, Takeshiki (Tsushima), and Makyu in the Pescadores Islands. This chart, which is based on an excellent map of Japan published by the Welcome Society, also shows the defended area and the principal commercial ports and railway lines. Naval dockyards and repairing stations.

The only yards in Japan which have actually built ships for the Imperial Navy are Yokosuka and Kure, and it may be taken that these arsenals are capable of turning out and fully equipping a second-class cruiser of 3000 to 5000 tons. The two latest home-built ships which have been added to the Navy are the Nütaka and Tsushima, believed to be very effective and well-constructed vessels of their type.

The naval ports in Japan are commanded by an executive naval officer of flag rank, the larger ports by a Vice-Admiral. He has a very complete and well-organised staff under him, consisting of a captain of the port, harbour-master, chief engineer, chief surgeon, and chief paymaster; the duties and responsibilities of each are carefully laid down. The large dockyards which are contained in the naval ports are commanded by a Rear-Admiral with a complete staff under him.

The building and repairing yards are organised and equipped in a manner which cannot be excelled by any similar institutions in the world, and there is no doubt that very good work is turned out. Kure in particular would be an object lesson to many who have not seen what a really well-organised dockyard should be. There are large graving docks, some of which are, however, it is believed, not yet completed, at the four principal naval ports, and very complete repairing facilities for the hull, engines and armament of a man-of-war.

The armament of the Japanese Fleet has been up to date supplied almost entirely by British firms, and principally by Armstrong, Whitworth and Company, but the arsenal at Kure has turned out modern heavy guns of the latest type, and will no doubt soon be capable of completely arming a battleship. A 9·2-in. gun from this arsenal was exhibited at the Osaka Exhibition in 1903, and Manufacture of guns and explosives.

appeared to be a beautiful model, the mounting, control arrangement, and breech mechanism being especially good. A 12-pdr. gun was also exhibited, the chief points of interest in which were the breech action of the continuous screw-thread type, and the arrangement for absorbing the recoil and returning the gun to the firing position, which was entirely contained in a jacket surrounding the gun, no recoil cylinders or springs being visible. Large guns are also manufactured at Osaka Arsenal, but for coast-defence batteries only, and small arms at the arsenal at Tokyo. Both of these establishments are for military armaments only. Projectiles of all sizes are also manufactured, and explosives of all descriptions are produced at the powder factories of Uji, Shimose, and Meguro; so that as far as ammunition is concerned, Japan is perfectly self-contained, and capable of meeting all probable demands from her Fleet.

Steel. The raw material for ship and gun construction is now produced in large quantities at the Imperial Steel Works, Wakamatsu, near Shimonoseki, and it is believed that 100,000 tons can be turned out annually. Part of the iron ore used is imported from China, and part is mined in Japan. The manufacture of steel in large quantities and the casting of heavy ingots is, of course, a new industry in Japan, but it is believed that the art of steel-making has been practised since the tenth century, and the fame of the old Japanese swords is well known to all.

Private yards. There are a great number of private firms in the shipbuilding trade, but the majority are only capable of constructing sailing vessels and small harbour craft. There are, however, some very fine private establishments, of which the Mitsui Bishi Dock Company at Nagasaki is the largest. This yard is equipped with docks capable of taking the largest ships, and can carry out repairs of all descriptions, many of the foreign warships on the China station being docked and refitted at Nagasaki, notably those of the German and French Navies. There are two large slips which are almost continuously occupied by ships under construction for the mercantile fleet, and ocean-going steamers are built, engined and completely equipped by the company. Other large firms are the Kawasaki Company at Kobe, the Yokohama and the Hakodate Dock Companies, the latter of which possesses a subsidised dock capable of taking any vessel up to about 10,000 tons. There are also large graving docks at Yokohama and Uraga, and there will no doubt in the future be docking facilities for the largest merchant ships at Osaka, where an immense harbour is now in course of completion.

From the above outline of the constructive, manufacturing, and

repairing resources it will be seen that Japan already possesses good facilities for the maintenance of a large fleet, and that it is probable that the day is not far distant when she will be able to turn out and fully equip war vessels and ocean steamships of the largest type, if not to compete with the large manufacturing nations in supplying ships to smaller Powers.

Organisation of the Fleet and sea training.

The ships of the Japanese Fleet are, like ours, attached to one of the principal naval ports for manning and refitting purposes, but there is only one squadron kept in permanent commission—*i.e.*, the standing squadron—which is commanded by a Vice-Admiral Commander-in-Chief, with two Rear-Admirals under him, one of whom is often, however, on detached service as commander of a small cruiser squadron.

In 1903 a training squadron was formed from the standing squadron, but detached from it under the command of Rear (now Vice-Admiral) Kamimura. This squadron, which consisted of the three similar cruisers, Matsushima, Hashidati, and Itsukushima, visited Australia, carrying a large number of midshipmen, and was accorded a very hearty reception.

A squadron under Vice-Admiral Gjuin, K.C.B., was also sent to England for the Coronation celebration, but with these exceptions the sea-work of the Fleet has been practically confined to home waters. It is perhaps unfortunate that stragetic considerations have prevented the Fleet generally from visiting distant waters and making themselves better known to the outside world.

The standing squadron consists generally of two battleships, two armoured, and from eight to ten second and third class cruisers. The remainder of the Fleet is divided between the principal naval ports of Yokosuka, Sasebo, Maizaru, and Kure, with a torpedo division at the secondary naval ports.

The Naval Port Divisions are not kept in full commission, but have, it is believed, a large portion of their crews on board, and those not under repair can be brought up to full complement and sent to sea at very short notice. The destroyers and torpedo-boats attached to these divisions are constantly exercised. The Port Divisions are under the command of the Commander-in-Chief of the port, who has full power as to their disposal within his command, and is entirely responsible for their efficiency.

The officers get their experience, as far as fleet work is concerned, from service in the standing squadron, or in the naval manœuvres, which were carried out on a grand scale in 1900, and again in 1903, every available ship being commissioned and practically every officer and man on the active list being employed in some capacity or

another. The manœuvres in each case were followed by a grand review at Kobe, at which the Emperor inspected the Fleet. The last occasion—April, 1903—will long be remembered as the final inspection of his Fleet by His Majesty before the war now in progress; and probably many officers and men who were present when the Asama, flying the Imperial standard, passed down the four lines of the finest Fleet ever seen in Far Eastern waters will never again take part in such a pageant.

ERIN.

PART II.

BRITISH AND FOREIGN

ARMOURED AND UNARMOURED SHIPS.

PART II.

ALPHABETICAL LIST OF BRITISH AND FOREIGN ARMOURED AND UNARMOURED SHIPS.

The arrangement of the lists of ships has again undergone important modifications. The order of the columns corresponds in the British and Foreign Lists, except that in the former there are spaces for the makers of engines. The principal change has been in further developing the columns devoted to protection. In the case of armoured ships, in addition to belt and deck armour, the side armour above the belt is shown, as well as the protection given both to main and secondary guns. This alteration will add considerably to the value of the tables. The calibre of all foreign guns is given in inches.

Another change is in stating the dates both of launch and completion throughout. Where a second date occurs in the "Launch" column, it is that of the reconstruction of the vessel.

The maximum draught at normal displacement has been given wherever it was possible to ascertain it.

As every nation is constantly rearranging the armament of individual ships, it is only possible to publish the latest accessible information.

Torpedo boats of all classes below torpedo-gunboats are placed in a separate list.

It will be understood that considerable difficulty is found in giving the exact cost of ships, especially of those in foreign Navies. The

system adopted is to give the cost of the ships complete, including armament, and where that is impossible, an indication is given of the fact.

Storeships, Harbour Service Ships, and Training Ships are not included in these lists, except in some cases as footnotes to the tables.

The ships of those Powers whose Navies are of small importance will be found at the end of Part II.

The following abbreviations are used throughout the Alphabetical List, occurring mainly in the first column, showing the class of ship, and in the armour column:—

a.c.	Armoured cruiser.
a.g.b.	Armoured gunboat.
b.	Barbette ship.
c.b.	Central-battery ship.
c.d.s.	Coast-defence ship.
comp. (in armour column).	Compound or steel-faced armour.
corv.	Corvette.
cr.	Cruiser.
d.v.	Despatch vessel.
g.b.	Gunboat.
g.v.	Gun-vessel.
H.S.	Harveyised or similar hard-faced steel.
K.S.	Krupp steel.
shd.	Sheathed.
2 s.	Twin screw.
t.	Turret-ship (in class column).
t.	Trial speed and I.H.P. at trials (in speed and I.H.P. columns).
to.cr.	Torpedo-cruiser.
to.g.b.	Torpedo-gunboat.
to.r.	Torpedo-ram.

ARMAMENT ABBREVIATIONS.—As breech-loading rifled guns are now almost universal in all fleets, it must be understood that all guns are of that description, unless it be otherwise indicated. As most guns of 6-in. calibre and under are quick-firers the letters Q.F. have been omitted.

l.	Light guns under 15 cwt., including boats' guns.
M.	Machine guns.
f. tu. or b. tu.	Fixed or bow tube for discharging fish torpedoes.
sub.	Submerged tube for do.
A.	Armstrong guns.
K.	Krupp guns.

BOILERS.—It has been thought desirable to indicate particulars of the water-tube boilers adopted in the principal fleets. The following abbreviations have, therefore, been given in the column devoted to indicated horse-power. Where no reference occurs the boilers are of the cylindrical type; but the letter "C" implies that

cylindrical boilers are used in conjunction with the type of water-tube boilers indicated :—

W.T.	Water-tube boilers, where the type is not known or not yet decided.
B.	Belleville.
Bl.	Blechynden.
B. & W.	Babcock and Wilcox.
D'A.	D'Allest.
D.	Dürr.
E.	Earle.
Ex.	Express.
Du T.	Du Temple.
L.	Laird.
L.N.	Laird-Normand.
M.	Mumford.
Nic.	Niclausse.
Nor.	Normand.
N.S.	Normand-Sigaudy.
R.	Reed.
T.	Thornycroft.
T.S.	Thornycroft-Schulz.
W.F.	White-Forster.
Y^1.	Yarrow small tube.
Y^2.	Yarrow large tube.

GREAT BRITAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.* Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Aboukir shd.	12,000	440	69½	26¼	21,000 B.	Fairfield	Fairfield	1900	1902	783,883	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	..	2 9·2-in., 12 6-in., 12 12-pr., 3 3-pr., 8 M., 2 l.	2	21	800 1600	755
a.c.	Achilles	13,550	480	73½	27	23,500 Y² & cyl.	Elswick	Hawthorn	Bldg.	..	†	6 K.S.	..	6	..	6	6	6 9·2-in., 4 7·5-in., 30 small.	3	22·33	1000	800
b. 1st cl.	Africa	16,350	425	78	26¾	18,000 B. & W. & cyl.	Chatham	J. Brown	Bldg.	..	†	9 H.S.	2–1	8	12 H.S.	12–6 H.S.	7 K.S.	4 12-in., 4 9·2-in., 10 6-in., 24 small.	2	18·5	950	800
b. 1st cl.	Albemarle	14,000	405	75½	26¼	18,296 B.	Chatham	Thames Ironworks	1901	1903	1,078,307	7–3 K.S.	2–1	..	7 K.S.	11 K.S.	6 K.S.	4 12-in., 12 6-in., 10 12-pr., 6 3-pr., 8 M., 2 l.	4	18·6 t	900 2000	750
b. 1st cl.	Albion	12,950	390	74	26	13,500 B.	Blackwall	Maudslay	1898	1902	883,805	6–2 H.N.	3–1	..	12–8 H.N.	12–6 H.N.	5 H.N.	4 12-in., 12 6-in., 10 12-pr., 6 3-pr., 8 M., 2 l.	4	18·25 t	1000 2300	700
a.c.	Antrim	10,700	450	68½	25	21,000 Y. & cyl.	Clydeb'nk	J. Brown & Co.	1903	..	839,809	6–2 H.N.	2–¾	..	4½ H.N.	6 H.N.	6 H.N.	4 7·5-in., 6 6-in., 10 12-pr., 3 3-pr., 8 M., 2 l.	2	22·25	800 1950	655
a.c.	Argyll					21,000 B. & W. & cyl.	Greenock	Greenock Foundry	1904	..	825,496											
b. 2nd c.	Anson	10,600	330	68½	27¼	11,500	Pembroke	Humphrys	1886	1889	780,667	18–8 comp.	3–2½	..	16–6 comp.	14–12 comp.	..	4 13·5-in., 6 6-in., 12 6-pr., 10 3-pr., 7 M., 2 l.	5	16·75 t	900 1200	515
a.c.	Aurora*	5600	300	56	24½	8500	Pembroke	Thomson	1887	1889	326,110	10 comp.	3–2	..	16 comp.	..	..	2 9·2-in., 10 6-in., 3 9-pr., 6 6-pr., 10 3-pr., 6 M.	2	16	750 900	485
a.c.	Australia						Glasgow	Napier	1886	1888	299,027											
a.c.	Bacchante shd.	12,000	440	69½	26¼	21,000 B.	Clydeb'nk	J. Brown	1902	1902	787,230	6–2 K.S.	3–1½	..	5 H.N.	6 K.S.	..	2 9·2-in., 12 6-in., 12 12-pr., 3 3-pr., 8 M., 2 l.	2	21	800 1600	755
b. 2nd c.	Barfleur shd.	10,500	360	70	25½	13,163	Chatham	Greenock Foundry	1892	1894	616,102	12 comp.	2½–2	4 N.S.	8 comp.	9 comp.	4–2 N.S.	4 10-in., 10 6-in., 2 9-pr., 8 6-pr., 12 3-pr., 7 M.	7	18·50	750 1240	625
a.c.	Bedford	9800	440	66	24½	22,457 B.	Fairfield	Fairfield	1901	1903	734,330	4–2 K.S.	2–¾	..	3 K.S.	4 K.S.	4 K.S.	14 6-in., 8 12-pr., 3 3-pr., 2 M., 2 l.	2	22·7 t	740 1760	687
b. 2nd c.	Benbow	10,600	330	68½	27¼	11,500	Blackwall	Maudslay	1885	1888	830,683	18–8 comp.	3–2½	..	18–6 comp.	14–12 comp.	..	2 16·25-in., 10 6-in., 12 6-pr., 10 3-pr., 7 M., 2 l.	5	16·75 t	900 1200	510
a.c.	Berwick	9800	440	66	24½	22,000 Nic.	W. Beardmore & Co.	Humphrys	1902	1903	776,868	4–2 H.S.	2¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 6-in., 10 12-pr., 3 3-pr., 9 M.G.	2	23·0	800 1600	655
a.c.	Black Prince	13,550	480	73½	27	23,500 B. & W. & cyl.	Blackwall	Thames Ironworks	Bldg.	..	1,138,606	6 K.S.	..	6	..	6	6	6 9·2-in., 10 6-in., 30 small.	2	22·33	1000	800
b. 1st cl.	Britannia	16,350	425	78	26¾	18,000 B&W&cyl	Portsm'th	Humphrys	Bldg.	..	†	9 H.S.	2–1	8	12 H.S.	12–6 H.S.	7 K.S.	4 12-in., 4 9·2-in., 10 6-in., 24 small.	2	18·5	950	800
b. 1st cl.	Bulwark	15,000	400	75	26¾	15,000 B.	Devonp't	Hawthorn	1899	1902	1,082,805	9 H.S.	3–2	3 K.S.	12 H.S.	12–5 H.S.	6–2 K.S.	4 12-in., 12 6-in., 16 12-pr., 6 3-pr., 8 M., 2 l.	2	18·0	900 2000	750
b. 1st cl.	Cæsar	14,900	390	75	27½	12,000	Portsm'th	Maudslay	1896	1897	935,746	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 H.S.	4 12-in., 12 6-in., 18 12-pr., 12 3-pr., 8 M., 2 l.	5	17·5	900 2000	757
b. 2nd c.	Camperdown	10,600	330	68½	27¼	11,500	Portsm'th	Maudslay	1885	1889	825,448	18 comp.	3–2½	..	16 comp.	12 comp.	..	4 13·5-in., 6 6-in., 12 6-pr., 10 3-pr., 7 M., 2 l.	4	16·9 t	900 1200	515
b. 1st cl.	Canopus§	12,950	390	74	26	13,500 B.	Portsm'th	Greenock Foundry	1897	1900	924,398	6 H.S.	..	2 N.S.	12 H.S.	12–5 H.S.	5 H.S.	4 12-in., 12 6-in., 10 12-pr., 6 3-pr., 8 M., 2 l.	5	18·25	800 1850	700
a.c.	Carnarvon	10,700	450	68½	25	21,000 Nic.&cyl.	Beardm're	Humphrys	1903	..	812,462	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 7·5-in., 6 6-in., 10 12-pr., 3 3-pr., 8 M., 2 l.	2	22·25	800	655
b. 2nd c.	Centurion shd.	10,500	360	70	25½	13,214	Portsm'th	Greenock Foundry	1892	1893	624,402	12 comp.	2½–2	4 N.S.	12 comp.	9 comp.	6–2 K.S.	4 10-in., 10 6-in., 8 6-pr., 12 3-pr., 7 M., 2 l.	7	18·25	750 1125	625
a.c.	Cochrane	13,550	480	73½	27	23,500 Y² & cyl.	Fairfield	Fairfield	Bldg.	..	†	6 K.S.	..	6	..	6	6	6 9·2-in., 4 7·5-in., 30 small.	3	22·33	1000	800
b. 2nd c.	Collingwood	9500	325	68	26¾	9500	Pembroke	Humphrys	1882	1886	..	18 comp.	2½	..	16 comp.	12 comp.	..	4 12-in., 6 6-in., 12 6-pr., 8 3-pr., 6 M., 2 l.	4	16·50	900 1200	480
t. 3rd c.	Colossus‡	9420	325	68	26¼	5500	Portsm'th	Maudslay	1882	1886	..	18–14 comp.	3–2½	..	16–13 comp.	16 comp.	..	4 12-in., 5 6-in., 4 6-pr., 10 3-pr., 6 M., 4 l.	2	14·2 t	970	388
b. 1st cl.	Commonwealth	16,350	425	78	26¾	18,000 B&W&cyl	Fairfield	Fairfield	1903	..	1,422,697	9 H.S.	2–1	8	12 H.S.	12–6 H.S.	7 K.S.	4 12-in., 4 9·2-in., 10 6-in., 24 small.	2	18·5	950	800
t. 3rd c.	Conqueror	6200	270	58	24	6000	Chatham	Humphrys	1881	1882	..	12–8½	2½–1¾	..	11½	12	..	2 12-in., 4 6-in., 6 6-pr., 12 M., 2 l.	6	15·3 t	650	330
a.c.	Cornwall	9800	440	66	24½	22,000 B. & W.	Pembroke	Hawthorn	1902	..	787,651	4–2 H.S.	2–¾	..	5 N.S.	5–4 N.S.	4 N.S.	14 6-in., 10 12-pr., 3 3-pr., 9 M.	2	23·0	800 1600	655
b. 1st cl.	Cornwallis	14,000	405	75½	26½	18,238 B.	Blackwall	Thames S. Co.	1899	1904	1,095,171	7 K.S.	..	1½	14 K.S.	11–6 K.S.	6 K.S.	4 12-in., 12 6-in., 12 12-pr., 6 3-pr.	4	18·9 t	900 2000	750
a.c.	Cressy shd.	12,000	440	69½	26¼	21,000 B.	Fairfield	Fairfield	1899	1901	780,110	6 K.S.	3–2	..	5 K.S.	6 K.S.	..	2 9·2-in., 12 6-in., 12 12-pr., 3 3-pr., 8 M., 2 l.	2	21·0	800 1600	755
a.c.	Cumberland	9800	440	66	24½	22,000 B.	London & Glasgow Co.	London & Glasgow Co.	1903	..	751,508	4–2 K.S.	2–¾	..	5	5–4	4 N.S.	14 6-in., 10 12-pr., 3 3-pr., 9 M.	2	23·0	800 1600	655

* Refitted by Messrs. John Brown & Co., Clydebank. † Details of cost incomplete. ‡ Refitted by the Thames Shipbuilding Co., Blackwall.
§ Refitting by Messrs. Cammell, Laird & Co., Birkenhead.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Devonshire	10,700	450	68½	25	21,000 Nic. & cyl.	Chatham	Thames Ironworks	Bldg.	..	851,576	6–2	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 2 l.	2	22·25	800 1600	655
t. 3rd c.	Devastation	9330	285	62¼	27½	7000	Portsm'th	Maudslay	1871	1873	..	12–10	3–2	..	12–10	14	..	4 *10-in.*, 6 *6-pr.*, 8 *3-pr.*, 5 M., 2 l.	2	14·0	1800	410
b. 1st cl.	Dominion	16,350	425	78	26¾	18,000 B. & W. & cyl.	Barrow	Vickers	1903	..	1,391,955	9 K.S.	2–1	8 K.S.	12 K.S.	12–6 K.S.	..	4 *12-in.*, 4 *9·2 in.*, 10 *6-in.*, 24 small.	2	18·5	950	800
a.c.	Donegal	9800	440	66	24½	22,000 B.	Fairfield	Fairfield Co.	1902	1903	752,964	4–2 K.S.	2–¾	..	5 K.S.	5–4	4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·0	800 1600	655
a.c.	Drake	14,100	500	71	26	30,557 B.	Pembroke	Humphrys	1901	1902	1,050,675	6 K.S.	3–2	2 K.S.	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*	2	23·0 *t*	1250 2500	900
a.c.	Duke of Edinburgh	13,550	480	73½	27	23,500 B. & W. & cyl.	Pembroke	Hawthorn Leslie	Bldg.	..	1,131,882	6 K.S.	..	6	..	6	6	6 *9·2-in.*, 10 *6-in.*, 30 small.	2	22·33	1000	800
b. 1st cl.	Duncan	14,000	405	75½	26½	18,222 B.	Blackwall	Thames S. Co.	1901	1903	1,090,208	7 K.S.	..	1½ K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	4	18·9 *t*	900 2000	750
t. 3rd c.	Edinburgh	9420	325	68	26¼	5500	Pembroke	Humphrys	1882	1886	†	18–14 *comp.*	3–2½	..	16–13 *comp.*	16 *comp.*	..	4 *12-in.*, 5 *6-in.*, 4 *6-pr.*, 10 *3-pr.*, 6 M., 2 l.	2	14·2	970	388
b. 1st cl.	Empress of India	14,000	380	75	27½	13,000	Pembroke	Humphrys	1891	1893	902,788	18–5 *comp.*	3	5	16 *comp.*	17–6 *comp.*	6–2 K.N.C.	4 *13·5-in.*, 10 *6-in.*, 16 *6-pr.*, 12 *3-pr.*, 8 M., 2 l.	7	17·5 *t*	900 1450	740
a.c.	Essex	9,800	440	66	24½	22,000 B.	Pembroke	John Brown	1901	1903	770,325	4–2 K.S.	2–¾	4 K.S.	5	5	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	..	23·0	800 1600	655
a.c.	Euryalus shd.	12,000	440	69½	26¼	21,000 B.	Barrow	Vickers	1901	1904	817,880	6 K.S.	3–2	2	5 K.S.	6 K.S.	..	2 *9·2-in.*, 12 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 8 M.	2	21·0	800 1600	755
b. 1st cl.	Exmouth	14,000	405	75½	26½	18,346 B.	Laird	Laird	1901	1903	1,099,674	7 K.S	..	1½ K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	4	19·0	900 2000	750
b. 1st cl.	Formidable	15,000	400	75	26¾	15,000 B.	Portsm'th	Earle	1898	1901	1,079,432	9 H.S.	3–2	2	12 H.S.	12–5	8 K.S.	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	..	18·0	900 2000	750
a.c.	Galatea	5600	300	56	24½	8500	Glasgow	Napier	1887	1889	291,803	10 *comp.*	3–2	..	16 *comp.*	4½	..	2 *9·2-in.*, 10 *6-in.*, 6 *6-pr.*, 10 *3-pr.*, 6 M., 3 l.	4	16·0	900	484
b. 1st cl	Glory	12,950	390	74	26	13,500 B.	Laird	Laird	1899	1901	888,649	6 H.S.	3–2	2 N.S.	12 H.S.	12–5 H.S.	5 H.S.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	5	18·25	800 1850	700
b. 1st cl.	Goliath ‡	12,950	390	74	26	13,500 B.	Chatham	Penn	1898	1900	915,588											
a.c.	Good Hope	14,100	500	71	26	31,088 B.	Fairfield	Fairfield	1901	1902	1,023,629	6 K.S.	3–2	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·0 *t*	1250 2500	900
a.c.	Hampshire	10,700	450	68½	24½	21,000 Y. & cyl.	Elswick	Hawthorn	1903	..	808,445	6–2 K.S.	2–¾	..	5 K.S.	5–4 N.S.	..	4 *7·5-in.*, 6 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 8 M. 2 l.	2	22·25	800 1600	655
b. 1st cl.	Hannibal	14,900	390	75	27½	12,000	Pembroke	Harland	1895	1897	958,877	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 8 M., 2 l.	5	17·5	900 2200	757
t. 3rd c.	Hero	6200	270	58	24	6000	Chatham	Rennie	1885	1888	473,575	12 *comp.*	..	..	11½ *comp.*	12 *comp.*	..	2 *12-in.*, 4 *6-in.*, 7 *6-pr.*, 12 M., 2 l.	6	15·2	620	330
b. 1st cl.	Hibernia	16,350	425	78	26¾	18,000 B. & W.	Devonp'rt	Harland & Wolff	Bldg.	..	†	9 H.S.	2–1	8	12 H.S.	12–6 H.S.	7 K.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 24 small.	2	18·5	950	800
b. 1st cl.	Hindustan						Clydeb'nk	J. Brown & Co.	1903	Bldg.	1,385,822	9 K.S.	2–1	..	12 K.S.	12 N.S.	6 N.S.					
a.c.	Hogue shd.	12,000	440	69½	26¼	21,000 B.	Barrow	Vickers	1900	1902	787,507	6 K.S.	3	2 H.S.	5 K.S.	6 K.S.	..	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	22·0	800 1600	755
t. 1st cl.	Hood	14,150	380	75	27½	13,000	Chatham	Humphrys	1891	1893	914,836	18 *comp.*	3	5 *comp.*	17 *comp.*	18–6 *comp.*	6–2	4 *13·5-in.*, 10 *6-in.*, 10 *6-pr.*, 12 *3-pr.*, 8 M., 2 l.	7	17·5	900 1800	730
c.d.s. *t.*	Hotspur	4010	235	50	21¾	2500	Glasgow	Napier	1870	1871	†	11 & 8	2–1	..	8	10–8½	..	2 *12-in.* M.L.R., 2 *6-in.*, 6 *12-pr.*, 4 *3-pr.*, 8 M., 2 l.	..	11·25 *t*	300	232
b. 1st cl.	Howe *	10,300	325	68	27¼	11,500	Pembroke	Humphrys	1885	1889	766,597	18 *comp.*	3–2½	..	16 *comp.*	11½ *comp.*	..	4 *13·5-in.*, 6 *6-in.*, 12 *6-pr.*, 10 *3-pr.*, 7 M., 2 l.	1	16·8	900 1200	515
b. 1st cl.	Illustrious	14,900	390	75	27½	12,000	Chatham	Penn	1896	1898	950,804	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 H.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 8 M., 2 l.	5	17·5	900 2200	757
a.c.	Immortalité	5600	300	56	22½	8500	Chatham	Earle	1887	1889	332,359	10 *comp.*	3–2	..	16 *comp.*	4½	..	2 *9·2-in.*, 10 *6-in.*, 6 *6-pr.*, 10 *3-pr.*, 6 M., 3 l.	2	16·0	900	484
a.c.	Impérieuse shd.	8400	315	62	27½	10,000	Portsm'th	Maudslay	1883	1886	†	10 *comp.*	4–2	..	9 *comp.*	4½ *comp.*	..	4 *9·2-in.*, 10 *6-in.*, 8 *6-pr.*, 10 *3-pr.*, 6 M., 2 l.	6	16·7 *t*	900 1130	544

* Being overhauled at Jarrow. † Details of cost incomplete. ‡ Refitting at Jarrow-on-Tyne.

GREAT BRITAIN.—Armoured Ships—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Armour: Gun Position: Heavy Guns.	Armour: Gun Position: Secondary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b. 1st cl.	Implacable						D'port	Laird	1899		1,075,277											
	Irresistible	15,000	400	75	26¾	15,000 B.	Chatham	Maudslay	1898	1902	1,081,391	9 K.S.	3–2	2	12 K.S.	12–5 K.S.	8	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	2	18·0	900 / 2000	755
	London						Portsm'h	Earle	1899		1,114,808											
a.c.	Kent	9800	440	66	24½	22,249 B.	Portsm'th	Hawthorn	1900	1903	733,940	4–2 K.S.	2–¾	4 K.S.	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	..	22·5 *t*	800 / 1600	500
a.c.	King Alfred	14,100	500	71	26	31,156	Barrow	Vickers	1901	1903	1,013,772	6-5-4 K.S.	2½–1	..	5 K.S.	6–5 K.S.	5 K.S.	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 3 *3-pr.*, 9 l.	2	23·46	1250 / 2500	813
	Leviathan					31,592 B.	Clydeb'k	J. Brown			1,043,917									23·25 *t*		
b. 1st cl.	King Edward VII.	16,350	425	78	26¾	18,000	Devonp'rt	Harland	1903	..	1,457,582	9 K.S.	2–1	8 K.S. ..	12 K.S. 5 K.S.	12–6 N.S. 5–4 N.S.	..	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 24 small.	2	18·5	950	800
a.c.	Lancaster	9800	440	66	24½	22,000 B.	Elswick	Hawthorn	1903	1904	763,084	4–2 K.S.	2–¾				4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·0	800 / 1600	500
b. 1st cl.	Jupiter	14,900	390	75	27½	12,000	Clydeb'nk	Thomson	1895	1897	966,856											
b 1st cl.	Magnificent	14,900	390	75	27½	12,000	Chatham	Penn	1894	1895	982,391	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 8	5	17·5	900 / 2200	757
b. 1st cl.	Majestic	14,900	390	75	27½	12,000	Portsm'th	Barrow	1895	1895	983,732											
b 1st cl.	Mars	14,900	390	75	27½	12,000	Birkenh'd	Laird	1896	1897	964,581											
a.c.	Monmouth	9800	440	66	24½	22,000 B.	Glasgow	London & Glasgow Shipbg.Co.	1901	1903	709,085	4–2 K.S.	2–¾	4 K.S.	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 8 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	..	23·0	800 / 1600	500
b. 1st cl.	Montagu	14,000	405	75½	26½	18,285 B.	Devonport	Laird	1901	1903	1,046,992	7 K.S.	2–1	1½	14 K.S.	11·6 N.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*, 2 M., 2 l.	4	18·8	900 / 2000	750
a.c.	Narcissus	5600	300	56	24½	8500	Hull	Earle	1886	1889	300,149	10 *comp.*	3–2	..	16 *comp.*	4½	..	2 *9·2-in.*, 10 *6-in.*, 6 *6-pr.*, 10 *3-pr*, 6 M., 3 l.	4	16	750 / 900	484
a.c.	Natal	13,550	480	73½	27	23,500 Y² & Cyl.	Barrow	Vickers	Bldg.	..	*	6 K.S.	..	6	..	6	6	6 *9·2-in.*, 4 *7·5-in.*, 30 small.	3	22·33	1000	800
b. 1st cl.	New Zealand	16,350	425	78	26¾	18,000 B. & W. & Cyl.	Portsm'th	Humphrys	1904	..	1,457,198	9 K.S.	2–1	..	12 K.S.	12 N.S.	6 N.S.	4 *12-in.*, 4 *9·2-in.*, 10 *6-in.*, 24 small.	2	18·5	950	800
t. 1st cl.	Nile	11,940	345	73	27½	12,000	Pembroke	Maudslay	1888	1890	890,283	20–16 *comp.*	3	3	18–14 *comp.*	18 *comp.*	..	4 *13·5-in.*, 6 *6-in.*, 8 *6-pr.*, 12 *3-pr.*, 7 M., 3 l.	6 (2 sub.)	16·7 *t*	900 / 1200	558
b. 1st cl.	Ocean	12,950	390	74	25½	13,500 B.	Devonport	Hawthorn	1898	1900	936,048	6 H.S.	..	2 K.S.	12 H.S.	12–5 H.S.	5 H.S.	4 *12-in.*, 12 *6-in.*, 10 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	5 (4 sub.)	18·25	800 / 1850	700
a.c.	Orlando	5600	300	56	24¾	8500	Jarrow	Palmer	1886	1888	303,065	10 *comp.*	3–2	..	16 *comp.*	4½ *comp.*	..	2 *9·2-in.*, 10 *6-in.*, 6 *6-pr.*, 10 *3-pr.*, 7 M., 3 l.	2	16	750	484
b. 1st cl.	Prince George	14,900	390	75	27½	12,000	Portsm'th	Humphrys	1895	1896	971,441	9 H.S.	4–2½	..	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 2 l.	5 (4 sub.)	17·5	900 / 2200	757
b. 1st cl.	Prince of Wales	15,000	400	75	26¾	15,000 B.	Chatham	Greenock Foundry	1902	1904	1,224,804	9 K.S.	2–1	3	12 K.S.	12–6 N.S.	6–2 K.S.	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	4	18	900	755
b. 1st cl.	Queen	15,000	400	75	26¾	15,000 B. & W.	Devonport	Harland & Wolff	1902	1904	1,206,980											
b 1st cl.	Renown . shd.	12,350	380	72	26¾	12,000	Pembroke	Maudslay	1895	1896	746,247	8–6 H.S.	3–2	..	10–6 H.S.	10 H.S.	6–2	4 *10-in.*, 10 *6-in.*, 12 *12-pr.*, 12 *3-pr.*, 8 M., 2 l.	5 (2 sub.)	18·0	900 / 1450	674
b. 1st cl.	Ramillies	14,000	380	75	27½	13,000	Glasgow	Thomson	1892	1893	952,550											
b 1st cl.	Repulse	14,000	380	75	27½	13,000	Pembroke	Humphrys	1892	1894	907,848	18–5 *comp.*	3	5–4 N.S.	16 *comp.*	17 *comp.*	6–2 K.N.O	4 *13·5-in.*, 10 *6-in.*, 16 *6-pr.*, 12 *3-pr.*, 8 M., 2 l.	7 (2 sub.)	17·5	900 / 1450	730
b. 1st cl.	Resolution	14,000	380	75	27½	13,000	Jarrow	Palmer	1892	1893	929,267											

* Details of cost incomplete.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Armour: Gun Position, Heavy Guns.	Armour: Gun Position, Secondary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.	in.	in.	in.	in.			knots.	tons.	
1st cl.	Revenge	14,000	380	75	27½	13,000	Jarrow	Palmer	1892	1895	927,386											
b. 1st cl.	Royal Oak	14,000	380	75	27½	13,000	Birkenh'd	Laird	1892	1894	1,014,943	18–5 *comp.*	3	5–4 N.S.	16 *comp.*	17 *comp.*	6–2 K.N.C.	4 *13·5-in.*, 10 *6-in.*, 16 *6-pr.*, 12 *3-pr.*, 8 M., 2 l.	7 (2 sub.)	17·5	900/1800	730
b. 1st cl.	Royal Sovereign	14,000	380	75	27½	13,312	Portsm'th	Humphrys	1891	1892	..											
b. 1st cl.	Rodney	10,300	325	68	27¼	11,500	Chatham	Humphrys	1884	1888	824,652	18 *comp.*	3–2½	..	16 *comp.*	11 *comp.*	..	4 *13·5-in.*, 6 *6-in.*, 12 *6-pr.*, 10 *3-pr.*, 6 M., 2 l.	4	16·75	900/1200	515
a.c.	Roxburgh	10,700	450	68½	25	22,000 D. & cyl.	London & Glasgow	London & Glasgow Company	1904	..	792,197	6–2 K.S.	2–¾	..	4½ K.S.	6 N.S.	6	4 *7·5-in.*, 6 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	22·25	800/1600	655
b. 1st cl.	Russell	14,000	405	75½	26½	18,229 B.	Jarrow	Palmer	1901	1903	1,098,717	7 K.S.	2–1	1½ K.S.	14 K.S.	11–6 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*	4	19·3 *t*	900/2000	750
b. 1st cl.	Sans Pareil	10,470	340	70	27¼	14,000	Blackwall	Humphrys	1887	1889	850,525	16–18 *comp.*	3	..	16 *comp.*	18 *comp.*	9·5	2 *16·25-in.*, 1 *10-in.*, 12 *6-in.*, 12 *6-pr.*, 12 *3-pr.*, 8 M., 2 l.	6 (2 sub.)	17·2 *t*	900/1200	583
a.c.	Suffolk	9800	440	66	24½	22,000 Nic.	Portsm'th	Humphrys	1903	1904	783,054	4–2 K.S.	2–¾	4 K.S.	5 K.S.	5–4 N.S.	4 K.S.	14 *6-in.*, 10 *12-pr.*, 3 *3-pr.*, 9 M.	2	23·0	800/1600	500
a.c.	Sutlej shd.	12,000	440	69½	26¼	21,000 B.	Clydeb'nk	Clydebank Company	1899	1902	790,706	6 K.S.	3–2	2	5 K.S.	6 K.S.	..	2 *9·2-in.*, 12 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	2	21·0	800/1600	755
b. 1st cl.	Swiftsure	11,800	436	71	24½	12,500	Elswick	Humphrys, Tennant	1903	1904–5	949,990	..	3	7	..	10	8	4 *10-in.*, 14 *7·5-in.*, 20 small.	2	21 *t*	800/2000	700
b. 1st cl.	Triumph						Barrow	Vickers	1903													
t. 2nd c.	Thunderer	9330	285	62¼	27	7000	Pembroke	Maudslay	1872	1877	873,038	12–10	3–2	..	12–10	14–12	..	4 *10-in.*, 6 *6-pr.*, 8 *3-pr.*, 4 M., 2 l.	2	14·0	1600	592
t. 1st cl.	Trafalgar	11,940	345	73	27½	12,000	Portsm'th	Humphrys	1887	1890	..	20–16 *comp.*	3	3	18–14 *comp.*	18 *comp.*	..	4 *13·5-in.*, 6 *6-in.*, 8 *6-pr.*, 12 *3-pr.*, 6 M., 3 l.	6 (2 sub.)	16·7 *t*	900/1200	572
a.c.	Undaunted	5600	300	56	22½	8500	Jarrow	Palmer	1886	1889	300,863	10 *comp.*	3–2	..	16 *comp.*	4½ *comp.*	..	2 *9·2-in.*, 10 *6-in.*, 6 *6-pr.*, 10 *3-pr.*, 7 M., 3 l.	4	16	750/900	484
b. 1st cl.	Victorious	14,900	390	75	27½	12,000	Chatham	Hawthorn	1895	1897	961,783	9 H.S.	3–2½	..	14–9 H.S.	14–6 H.S.	6	4 *12-in.*, 12 *6-in.*, 18 *12-pr.*, 12 *3-pr.*, 8 M., 2 l.	5 (4 sub.)	17·5	900/2200	757
b. 1st cl.	Venerable	15,000	400	75	26¾	15,345 B.	Chatham	Maudslay	1899	1902	1,153,974	7 K.S.	4–2½	3	14 K.S.	11–6 K.S.	6–2	4 *12-in.*, 12 *6-in.*, 16 *12-pr.*, 6 *3-pr.*, 8 M., 2 l.	2	18·3 *t*	900/2000	755
b. 1st cl.	Vengeance	12,950	390	74	26	13,500 B.	Barrow	Vickers	1899	1901	880,872	6 H.N.S.	2–1	..	12 H.N.S.	12–6 H.S.	5 H.S.	4 *12-in.*, 12 *6-in.*, 12 *12-pr.*, 6 *3-pr.*, 8 M.	4	18·5	800/1850	750
a.c.	Warrior	13,550	480	73½	27	23,500 Y² & cyl.	Pembroke	Yarrow	Bldg.	..	*	6 K S.	..	6	..	6	6	6 *9·2-in.*, 4 *7·5-in.*, 30 small.	3	22·33	1000	800
a.c.	Warspite	8400	315	62	27¼	10,000	Chatham	Penn	1884	1888	653,072	10 *comp.*	3–2	..	9 *comp.*	8 *comp.*	..	4 *9·2-in.*, 10 *6-in.*, 4 *6-pr.*, 9 *3-pr.*, 6 M., 2 l.	6	16·7	900/1130	535

2 new battleships, Lord Nelson class, Programme 1904–5. Details not known. To be built by contract.

4 armoured cruisers, modified Duke of Edinburgh class, Programme 1904–5. Details not known.

* Details of cost incomplete.

GREAT BRITAIN.—Cruising Ships, &c.

Class.	Name.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
Scout	Adventure	2910	374	38½	13¾	16,000 Y mod.	Elswick	Hawthorn	Bldg.	..	274,075	2	¾	10 12-pr., 8 1½-pr.	2	25	470	268
2nd cl. Cr.	Æolus . shd.	3600	300	43	17½	9000	Devonp'rt	Hawthorn	1892	1893	218,246	2-1	2	2 6-in., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400 / 535	273
Dsp. Ves.	Alacrity	1700	250	32½	14	3000	Jarrow	Palmer	1885	1887	85,518	..	..	10 6-pr., 2 M.	..	17·00	400	114
T. G. B.	Alarm	810	230	27	8¾	3384	Sheerness	Penn	1892	1893	64,349	..	2	2 4·7-in., 4 3 pr.	3	19·25	100	91
2nd cl. G. B.	Albacore	560	135	26	10½	500	Birkenh'd	Laird	1883	1884	..	..	..	2 5-in., 2 4-in., 2 M.	..	11·0	85	59
Sloop	Alert . shd.	960	180	32½	11½	1400	Sheerness	Sheerness	1894	1896	64,889	..	..	6 4-in., 25-pr., 4 3-pr., 2 M.	..	13·25	130	101
"	Algerine	1050	185	32½	11¼	1400	Devonp'rt	Devonport	1895	1896	68,604	..	0·22	6 4-in, 25-pr., 4 3-pr., 3 M.	..	13·0	160	106
3rd cl. Cr.	Amethyst	3000	360	40	14½	9800 Y mod.	Elswick	Parsons' Turbine	1903	..	236,527	..	..	12 4-in., 8 3-pr.	..	21·75	300	296
2nd cl. Cr.	Amphion	4300	300	46	20½	5000	Pembroke	Maudslay	1883	1886	..	1½	..	10 6-in., 4 3-pr., 10 M., 2 l.	4	16·6	550 / 1000	309
1st cl. Cr.	Amphitrite shd.	11,000	435	69	25¼	18,000 B.	Barrow	Vickers	1898	1900	575,300	4	3-6 H. S.	16 6-in., 14 12-pr., 3 3-pr., 8 M.	3 (2 sub.)	20·75	1000	677
2nd cl. Cr.	Andromache	3400	300	43	16½	9000	Chatham	Earle	1890	1892	195,965	2-1	2	2 6-in., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
1st cl. Cr.	Andromeda shd.	11,000	435	69	25¼	16,500 B.	Pembroke	Hawthorn	1897	1900	601,356	3-6	3	16 6-in., 12 12-pr., 4 3-pr., 2 l., 8 M.	3	20·5	1000	600
T. G. B.	Antelope	810	230	27	8¾	3621	Devonp'rt	Yarrow	1893	1894	68,939	..	2	2 4·7-in., 4 3-pr.	3	19·25	100	91

Class.	Name.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
2nd cl. Cr.	Apollo	3400	300	43	16½	9000	Chatham	Earle	1891	1892	195,646	2-1	2	2 6-in., 6 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	20·0	400	273
3rd cl. Cr.	Archer	1770	225	36	14½	3500	Glasgow	Thomson	1885	1888	97,449	..	..	6 6-in., 8 3-pr., 2 M., 1 l.	3	16·5	475	172
" "	Arethusa	4300	300	46	20½	5000	Glasgow	Napier	1882	1887	189,340	1½	..	10 6-in., 8 3-pr., 6 M., 2 l.	4	16·6	500 / 1000	309
1st cl. Cr.	Argonaut . shd.	11,000	435	69	25¼	18,000 B.	Fairfield	Fairfield	1898	1900	573,704	4	3-6 H. S.	16 6-in., 14 12-pr., 3 3-pr., 8 M.	3 (2 sub.)	20·75	1000	677
" "	Ariadne . shd.	11,000	435	69	25¼	18,000 B.	Clydeb'nk	John Brown	1898	1900	565,464							
2nd cl. Cr.	Arrogant	5800	320	57½	21	10,000 B.	Devonp'rt	Earle	1896	1898	..	1-2 N. S.	3 N.S.	10 6-in., 9 12-pr., 3 3-pr., 1 l., 5 M.	2	19·1	500	480
3rd cl. Cr.	Astræa* . shd.	4360	320	49½	19	9112	Devonp'rt	Devonport	1893	1894	265,745	2-1	2	2 6-in., 8 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·75	400	312
Scout	Attentive	2910	374	38¼	13¾	16,000 Y.	Elswick	Hawthorn	Bldg.	..	..	2	¾	10 12-pr., 8 1½-pr.	2	25	470	268
3rd cl. Cr.	Barham	1830	280	35	13¼	4700 T.	Portsm'th	Hawthorn	1889	1890	120,107	2-1	2	6 4·7-in., 4 3-pr., 2 M.	2	18·6	140	169
" "	Bellona	1830	280	35	13¼	4700 T.	Newcastle	Hawthorn	1890	1891	99,274	2-1	2	6 4·7-in., 4 3-pr., 2 M.	2	17·8	140	169
" "	Barracouta	1580	220	35	14	3000	Sheerness	Palmer	1889	1890	101,690							
" "	Barrosa	1580	220	35	14	3000	Portsm'th	Palmer	1889	1890	91,577	2-1	2	6 4·7-in., 4 3-pr., 3 M.	2	16·5	160	159
" "	Blanche . shd.	1580	220	35	14	3000 L.	Pembroke	Laird	1889	1891	97,524							
" "	Blonde . shd.	1580	220	35	14	3000 L.	Pembroke	Laird	1889	1891 1902	97,406							
Sloop	Beagle . shd.	1170	195	28	12½	2000	Portsm'th	Rennie	1889	1890	67,632	..	..	8 5-in., 8 M.	..	14·7	160	138
1st cl. Cr.	Blake	9000	375	65	25¾	20,000	Chatham	Maudslay	1889	1892	464,483	6-3	6	2 9·2-in., 10 6-in., 16 3-pr., 7 M., 2 l.	4	21·5	1500	570
" "	Blenheim	9000	375	65	25¾	21,411	Blackwall	Humphrys	1890	1893	453,930							
3rd cl. Cr.	Bonaventure shd.	4360	320	49½	19	9000	Devonp'rt	Hawthorn	1892	1894	258,974	2-1	2	2 6-in., 8 4·7-in., 8 6-pr., 1 3-pr., 4 M., 1 l.	4	19·5	400	312

* Refitted by the London & Glasgow Co.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
T. G. B.	Boomerang (Australia)	735	230	27	8¼	3500	Elswick	Bellis	1889	1891	52,076	..	2	2 4·7-*in.*, 4 3-*pr.*, 1 M.	3	20·0	100	91
3rd cl. Cr.	Brilliant . shd.	3600	300	43¾	17½	9164	Sheerness	Hawthorn.	1891	1893	219,852	2–1	2	2 6-*in.*, 6 4·7-*in.*, 8 6-*pr.*, 1 3-*pr.*, 4 M., 1 l.	4	19·7	400	273
3rd cl. Cr.	Brisk.	1770	225	36	14¼	3500	Glasgow	Thomson	1886	1888	100,577	..	..	6 6-*in.* Q.F.C., 8 3-*pr.*, 2 M., 1 l.	3	16·5	325	172
1st cl. G. B.	Bramble	700	180	33	8	1300 Y.	Liverpool	Fawcett & Co.	1898	1901	53,652	..	..	2 4-*in.*, 4 12-*pr.*	..	13·5	50	85
" "	Britomart	700	180	33	8	1300 Y.	Liverpool	Fawcett & Co.	1898	1901	53,634	..	..	2 4-*in.*, 4 12-*pr.*	..	13·5	50	85
Sloop	Cadmus . shd. / Clio . shd.	1070	185	33	11¼	1400 Nic.	Sheerness	J. S. White & Co., Sheerness	1903	1904	86,927 / 92,535	..	..	6 4-*in.* and 4 3-*pr.*	..	13·0 to 13·25	160	150
Sloop	Buzzard	1140	195	28	11½	2000	Sheerness	Barrow	1887	1888	85,214	..	..	8 5-*in.*, 8 M.	2	14·50	160	138
3rd cl. Cr.	Calliope . shd.	2770	235	44½	20	4020	Portsm'th	Rennie	1884	1886	..	1½	..	4 6-*in.*, 12 5-*in.* 38 *cwt.* 9 M., 2 l.	2	14·6	550	293
" "	Calypso . shd.	2770	235	44½	20	4000	Chatham	Rennie	1883	1886	..							
3rd cl. Cr.	Cambrian. shd.	4360	320	49½	19	9000	Pembroke	Hawthorn.	1893	1894	248,883	2–1	2	2 6-*in.*, 8 4·7-*in.*, 8 6-*pr.*, 1 3-*pr.*, 4 M., 1 l.	4	19·5	400	312
2nd cl. Cr.	Challenger	5880	355	56	21¼	12,500 B.&W.	Chatham	Wallsend Eng'ng Co.	1902	..	411,530	..	..	11 6-*in.*, 9 12-*pr.*, 6 3-*pr.*	..	20·75 to 21·0	500	..
3rd cl. Cr.	Champion. shd.	2380	225	44½	19¼	2000	Glasgow (Fairfield)	Elder	1878	1880	..	1½	..	4 6-*in.*, 8 5-*in.*, 4 3-*pr.*, 6 M., 2 l.	2	12·75	470	265
" "	Cleopatra. shd.	2380	225	44½	19¼	2000	Glasgow (Fairfield)	Humphrys	1878	1881	..	1½	..	4 6-*in.*, 8 5-*in.*, 4 3-*pr.*, 6 M., 2 l.	2	13·0	470	265
3rd cl. Cr.	Charybdis shd.	4360	320	49½	19	9000	Sheerness	Earle	1893	1895	253,135	2–1	2	2 6-*in.*, 8 4·7-*in.*, 8 6-*pr.*, 1 3-*pr.*, 4 M., 1 l.	4	19·5	400	312
T. G. B.	Circe*	810	230	27	8¾	5800 F.	Sheerness	Penn	1892	1893	64,122	..	2	2 4·7-*in.*, 4 3-*pr.*	3	21·6	100	91
3rd cl. Cr.	Cossack	1770	225	36	14¼	3500	Glasgow	Thomson	1886	1889	99,027	..	..	6 6-*in.*, 8 3-*pr.*, 2 M., 1 l.	3	16·5	325	172
1st cl. Cr.	Crescent† . shd.	7700	360	60	23¾	12,000	Portsm'th	Penn	1892	1894	411,108	5–1	6	1 9·2-*in.*, 12 6-*in.*, 12 6-*pr.*, 5 3-*pr.*, 7 M., 2 l.	4 (2 sub.)	19·7	850	560
G. V.	Curlew	950	195	28	10½	1200	Devonp'rt	Penn	1885	1887	..	..	..	1 6-*in.*, 3 5-*in.*, 7 M.	1	14·5	250	103
1st cl. Cr.	Diadem‡ . shd.	11,000	435	69	26	16,500 B.	(Fairfield)	Fairfield	1896	1899	582,662	4–2½	4½–2	16 6-*in.*, 14 12-*pr.*, 4 3-*pr.*, 8 M.	3 (2 sub.)	20·5	1000	357
3rd cl. Cr.	Diamond	3000	360	40	14½	9800 L.N.	Laird	Laird	1904	..	247,480	..	..	12 4-*in.*, 8 3-*pr.*	..	21·75	300	296
2nd cl. Cr.	Diana . shd.	5600	350	54	21	9600	(Fairfield)	Fairfield	1895	1898	269,639	2¼	3	11 6-*in.*, 9 12-*pr.*, 7 3-*pr.*, 5 M., 1 l.	3 (2 sub.)	19·5	550	470
" "	Dido . shd.	5600	350	54	21	9600	Glasgow	London and Glasgow Co.	1896	1898	268,188							
" "	Doris . shd.	5600	350	54	21	9600	Barrow	Barrow	1896	1898	270,823							
T. G. B.	Dryad	1070	250	30½	9	3500	Chatham	Maudslay	1893	1894	75,921	..	2	2 4·7-*in.*, 4 6-*pr.*	3	19·0	100	120
1st cl. G. B.	Dwarf	700	180	33	8	1300 Y.	Glasgow	London and Glasgow Co.	1898	1900	54,369	..	..	2 4-*in.*, 4 12-*pr.*	..	13·5	50	85
2nd cl. Cr.	Eclipse . shd.	5600	350	53	20¼	9600	Portsm'th	Portsm'th	1894	1897	292,745	1½–3	3	11 6-*in.*, 8 12-*pr.*, 6 3-*pr.*, 5 M., 1 l.	3	19·5	550	477
1st cl. Cr.	Edgar	7350	360	60	23¾	12,000	Devonp'rt	Fairfield	1890	1893	428,081	5–1	6	2 9·2-*in.*, 10 6-*in.*, 12 6-*pr.*, 5 3-*pr.*, 7 M., 2 l.	4	20·5	850	544
2nd cl. Cr.	Encounter	5880	355	56	21¼	12,500 Dürr	Devonp'rt	Keyham	1903	..	437,119	..	..	11 6-*in.*, 9 12-*pr.*, 6 3-*pr.*	..	20·75 to 21·0	600	..
1st cl. Cr.	Endymion§	7350	360	60	23¾	12,000	Hull	Earle	1891	1894	397,973	5–1	6	2 9·2-*in.*, 10 6-*in.*, 12 6-*pr.*, 5 3-*pr.*, 7 M., 2 l.	4	20·5	850	544
Sloop	Egeria	940	160	31½	14¼	700	Pembroke	Humphrys	1873	1875	..	..	..	4 20-*pr.*, 2 M., 1 l.	..	11·3	100	122
"	Espiègle . shd.	1070	185	33	11¼	1400 B.&W.	Sheerness	Wallsend Slipway Co.	1903	1902	80,459	..	..	6 4-*in.*, 4 3-*pr.*	..	13·5	160	160

* Re-engined and reboilered with Thorneycroft small-tube water-tube boilers at Fairfield. † Refitted by the Thames Company. ‡ Under repair at Fairfield. § Refitted by Messrs. Harland & Wolff.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Makers of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
1st cl. Cr.	Europa . shd.	11,900	435	69	26	16,500 B.	Clydeb'nk	Thomson	1897	1899	589,835	4–2½	4½–2	16 *6-in.*, 14 *12-pr.*, 4 *3-pr.*, 8 M.	3	20·5	1000	357
Sloop	Fantôme . shd.	1070	185	33	11¼	1400 Nic.	Sheerness	Devonport	1902	1902	93,975	..	..	6 *4-in.*, 4 *3-pr.*	..	13·5	160	160
3rd cl. Cr.	Fearless	1580	220	34¼	14½	3200	Barrow	Barrow	1886	1888	92,103	..	..	4 *4·7-in.*, 8 *3-pr.*, 2 M., 1 l.	3	16·7	450	147
2nd cl. G. B.	Firebrand	455	125	23½	10	360	Glasgow	Thomson	1877	1879	..	..	..	2 *5-in.*, 2 *4-in.*, 2 M.	..	10·17	40	61
3rd cl. Cr.	Flora . shd.	4360	320	49½	19	9000	Pembroke	Barrow	1893	1895	253,783							
" "	Forte. . shd.	4360	320	49½	19	9000	Chatham	Chatham	1893	1895	252,780	2–1	2	2 *6-in.*, 8 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·5	400	312
" "	Fox . shd.	4360	320	49½	19	9000	Portsm'th	Portsm'th	1893	1895	256,042							
" "	Forth	4050	300	46	20	5700	Pembroke	Hawthorn	1886	1889	247,720	3–2	2	2 *8-in.*, 10 *6-in.*, 3 *6-pr.*, 8 *3-pr.*, 6 M., 2 l.	2	16·8	900	326
Scout.	Foresight	2545	360	38¼	13	16,000 F.	Fairfield	Fairfield	Bldg.	..	287,374	1½–⅝	..	10 *12-pr.*, 8 *1½-pr.*	2	25·0	165 / 380	268
"	Forward																	
2nd cl. Cr.	Furious . shd.	5750	320	57½	21	10,000 B.	Devonp'rt	Earle	1896	1899	288,830	1–2	3	10 *6-in.*, 9 *12-pr.*, 3 *3-pr.*, 5 M., 1 l.	2	19·0	500	480
" "	Gladiator . shd.					10,000 B.	Portsm'th	Maudslay	1896	1900	300,612							
1st cl. Cr.	Gibraltar . shd.	7700	360	60	23¾	12,000	Glasgow	Napier	1892	1894	377,741	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 7 M., 2 l.	4	19·7	850	544
T. G. B.	Gleaner	735	230	27	8¼	3600	Sheerness	Sheerness	1890	1892	65,912	..	2	2 *4·7-in.*, 4 *3-pr.*	3	20·3 *t*	100	91
"	Gossamer	735	230	27	8¼	6058 R.	Sheerness	Sheerness	1890	1891 1902	65,273	..						
1st cl. G. B.	Goldfinch	805	165	31	11½	1200	Sheerness	Sheerness	1889	1890	49,060	5·1	..	6 *4-in.*, 2 *3-pr.*, 2 M.	..	13·0	105	76
1st cl. Cr.	Grafton	7350	360	60	23¾	12,000	Blackwall	Humphrys	1892	1894	381,958	..	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 7 M., 2 l.	4	20·0	850	560
T. G. B.	Grasshopper	525	200	23	8¾	2700	Sheerness	Maudslay	1887	1888	47,750	..	..	1 *4-in.*, 6 *3-pr.*	4	17·0	80	67
"	Halcyon*	1070	250	30½	9	3500	Devonp'rt	Hawthorn	1894	1895	77,521	..	2	2 *4·7-in.*, 4 *6-pr.*	3	19·0	100	120
"	Harrier	1070	250	30½	9	3500	Devonp'rt	Hawthorn	1894	1895	75,858	..						
1st cl. Cr.	Hawke	7350	360	60	23¾	12,000	Chatham	Fairfield	1891	1893	413,101	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 7 M., 2 l.	4	20·0	850	544
T. G. B.	Hazard	1070	250	30½	9	3500	Pembroke	Fairfield	1894	1894	76,506	..	2	2 *4·7-in.*, 4 *6-pr.*	3	19·0	100	120
"	Hebe	810	230	27	8¾	3566	Sheerness	Sheerness	1892	1894	75,630	..	2	2 *4·7-in.*, 4 *3-pr.*	3	19·25	100	91
T. D. S.	Hecla†	6400	391½	38¾	24¼	2400	Belfast	Harland & Wolff	1878	1879	..	..	..	4 *7·5-in.*, 14 M.	4	13·0	2200	277
2nd cl. Cr.	Hermes‡ . shd.	5600	350	54	20½	10,000 B.&W.	Fairfield	Fairfield	1898	1900 1902	300,593							
" "	Highflyer§ shd.	5600	350	54	20½	10,000 B.	Fairfield	Fairfield	1898	1900	298,863	1½–3	3	11 *6-in.*, 9 *12-pr.*, 6 *3-pr.*, 6 M.	..	20·0	600	477
" "	Hyacinth . shd.	5600	350	54	20½	10,000 B.	Glasgow	London and Glasgow Co.	1898	1901	304,139							
3rd cl. Cr.	Hermione shd.	4360	320	49½	19	9000	Devonp'rt	Thomson	1893	1895	235,231	2–1	2	2 *6-in.*, 8 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·5	400	312
T. G. B.	Hussar	1070	250	30½	9	3500	Devonp'rt	Hawthorn	1894	1895	75,316	..	2	2 *4·7-in.*, 4 *6-pr.*	3	19·0	100	120
3rd cl. Cr.	Indefatigable shd.	3600	300	43¾	17½	9000	Glasgow	London and Glasgow Co.	1891	1892	190,309							
" "	Intrepid . shd.	3600	300	43¾	17½	9000	Glasgow	London and Glasgow Co.	1891	1893	190,452	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 1 M., 1 l.	4	19·75	400	273
" "	Iphigenia . shd.	3600	300	43¾	17½	9000	Glasgow	London and Glasgow Co.	1891	1893	190,965							
" "	Iris	3730	300	46	22	6000	Pembroke	Maudslay	1877	1880	..	..	..	13 *5-in.*, 4 *3-pr.*, 8 M., 1 l.	3	18·0	780	450

* Under repair by contract. † Refitted by Laird Bros. for special service as fleet repair ship. ‡ Reboilered at Harland & Wolff's, Belfast. § Refitting at Fairfield.

GREAT BRITAIN.—Cruising Ships, &c.—*continued*.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
3rd cl. Cr.	Isis . shd.	5600	350	54	21	9600	Glasgow	London and Glasgow Co.	1896	1898	268,725	2½	3	11 *6-in.*, 9 *12-pr.*, 7 *3-pr.*, 5 M., 1 l.	4 (2 sub.)	20·0	550	470
" "	Juno . shd.	5600	350	54	21	9600	Barrow	Barrow	1895	1898	270,993							
T. G. B.	Jaseur	810	230	27	8¾	3711	Barrow	Barrow	1892	1894	50,425	..	2	2 *4·7-in.*, 4 *3-pr.*	3	21·9 t	100	91
"	Jason*	810	230	27	8¾	5800 R.	Barrow	Barrow	1892	1893 1902	51,369							
"	Karrakatta (Australia)	735	230	27	8½	3500	Elswick	Bellis	1890	1891	51,949	..	2	2 *4·7-in.*, 4 *3-pr.*	3	20·0	100	91
3rd cl. Cr.	Katoomba (Australia)	2575	265	41	15½	7500	Elswick	Hawthorn	1889	1891	124,316	2	2-1	8 *4·7-in.*, 8 *3-pr.*, 4 M., 1 l.	4	19·0	300	217
G. V.	Landrail	950	195	28	10½	1200	Devonp'rt	Penn	1886	1887	..	..	..	1 *6-in.*, 3 *5-in.*, 4 *3-pr.*, 3 M.	..	14·5	250	46
1st cl. G.B.	Lapwing	805	165	31	11½	1200	Devonp'rt	Devonport	1889	1890	50,635	..	..	6 *4-in.*, *25-cwt.*, 2 *3-pr.*, 2 M.	..	13·0	105	76
3rd cl. Cr.	Latona	3400	300	43	16½	9000	Barrow	Barrow	1890	1892	180,353	2	2–1	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	20·0	400	273
T. G. B.	Leda*	810	230	27	8¾	5800 T.	Sheerness	Penn	1892	1894	64,332	2	..	2 *4·7-in.*, 4 *3-pr.*	3	21·8	100	91
1st cl. G.B.	Lizard	715	165	29	11¾	1000	Belfast	Harland	1886	1882	55,131	..	..	6 *4-in.*, 4 M.	..	13·0	105	76
3rd cl. Crs.	Magicienne shd.	2950	265	42	17½	9000	Glasgow (Fairfield)	Hawthorn	1888	1890	149,801	..	1½	6 *6-in.*, 9 *6-pr.*, 1 *3-pr.*, 3 M., 1 l.	4	19·0	400	218
	Marathon. shd.										149,972							
1st cl. G.B.	Magpie	805	165	31	11½	1200	Pembroke	Earle	1889	1890	45,678	..	..	6 *4-in.*, 4 M.	..	13·0	105	76
3rd cl. Crs.	Medea	2800	265	41	16½	9000 Y.	Chatham	Humphrys	1888	1889	171,874	..	1½	6 *6-in.*, 9 *6-pr.*, 1 *3-pr.*, 3 M., 1 l.	4	19·0	400	218
	Medusa					9000 Dürr				1902	171,099							
3rd cl. Cr.	Melampus	3400	300	43	16½	9000	Barrow	Barrow	1890	1892	180,920	2	2–1	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	20·0	400	273
Sloop	Melita	970	167	32	13½	1200	Malta	Malta Dock Yard	1888	1889	80,729	..	..	8 *5-in.*, 8 M., 1 l.	..	12·50	150	125
3rd cl. Cr.	Melpomene shd.	2950	265	41	17½	9000	Portsm'th	Palmer Co.	1888	1890	173,872	..	1½	6 *6-in.*, 9 *6-pr.*, 1 *3-pr.*, 3 M., 1 l.	4	19·0	400	218
" "	Mercury	3730	300	46	20½	6000	Pembroke	Maudslay	1878	1884	..	..	..	13 *5-in.*, 4 *3-pr.*, 9 l.	4	16·8	780	291
Sloop	Merlin . shd.	1070	185	33	11½	1400 B.	Sheerness	Devonport	1901	1902	95,788	..	..	6 *4-in.*, 4 *3-pr.*	..	13·25	160	160
2nd cl. Cr.	Mersey	4050	300	46	19½	6000	Chatham	Humphrys	1885	1888	..	3–2	4	2 *8-in.*, 10 *6-in.*, 9 f.c., 3 *6-pr.*, 8 *3-pr.*, 5 M., 2 l.	4	17·3	900	327
3rd cl. Cr.	Mildura (Australia)	2575	265	41	15½	7500	Elswick	Hawthorn	1889	1891	123,659	2–1	2	8 *4·7-in.*, 8 *3-pr.*, 4 M., 1 l.	4	19·0	300	217
2nd cl. Cr.	Minerva . shd.	5600	350	53	20½	9600	Chatham	Chatham	1895	1897	291,037	1½-3	3	11 *6-in.*, 9 *12-pr.*, 6 *3-pr.*, 5 M.	3 (2 sub.)	20·3	550	437
3rd cl. Cr.	Mohawk	1770	225	36	14½	3500	Glasgow	Thomson	1886	1888	97,731	..	..	6 *6-in.*, 8 *3-pr.*, 2 M., 1 l.	3	16·5	475	172
Sloop	Mutine	980	180	33	11½	1400 B.	Laird	Laird	1901	1902	67,243	..	..	6 *4-in.*, 4 *3-pr.*	..	13·25	130	130
3rd cl. Cr.	Naiad	3400	300	43	16½	9000	Barrow	Barrow	1890	1892	180,730	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	20·0	400	273
1st cl. Cr.	Niobe † . shd.	11,000	435	69	26	16,500 B.	Barrow	Vickers	1897	1899	574,878	4–2½	4½–2	16 *6-in.*, 14 *12-pr.*, 4 *3-pr.*, 8 M.	3 (2 sub.)	20·5	1000	600
Sloop	Nymphe	1140	195	28	12½	2000	Portsm'th	Greenock F'ndry Co.	1888	1889	71,984	..	..	8 *5-in.*, 8 M.	..	14·0	160	138
T. G. B.	Niger	810	230	27	8¾	6282 R.	Barrow	Barrow	1892	1894 1902	50,364	..	2	2 *4·7-in.*, 4 *3-pr.*	3	20·5 t	100	91
Sloop	Odin . shd.	1070	185	33	11½	1400 B & W	Sheerness	Devonport	1901	1902	86,627	..	..	6 *4-in.*, 4 *3-pr.*	..	13·25	160	160
T. G. B.	Onyx	810	230	27	8¾	3548	Birkenh'd	Laird	1892	1894	56,148	..	2	2 *4·7-in.*, 4 *3-pr.*	3	19·25	100	91

* Re-engined and reboilered. † Under repair at Barrow.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
3rd cl. Cr.	Pallas	2575	265	41	15½	7610	Portsm'th	Hawthorn.	1890	1891	156,425	2–1	2	8 *4·7-in.*, 8 *3-pr.*, 4 M., 1 l.	4	19·25	300	217
" "	Pearl	2575	265	41	15½	7500	Pembroke	Earle	1888	1892	159,290							
Scout	Pathfinder	2500	360	38	13¼	17,000 L.N.	Birkenh'd	Laird	Bldg.	..	278,337	½–⅝	..	10 *12-pr.*, 8 *1½-pr.*	2	25	165 / 380	268
"	Patrol																	
1st cl. G. B.	Partridge	755	165	30	11¼	1200	Devonp'rt	Devonport	1888	1889	50,121	..	..	6 *4-in.*, 4 M.	..	13·25	105	76
" "	Peacock	755	165	30	11¼	1200	Pembroke	Barrow Co.	1888	1889	45,552							
3rd cl. Cr.	Pactolus	2135	300	36½	17	7000 Bl.	Elswick	Penn	1897	1899	145,770	2	·22	8 *4-in.*, 8 *3-pr.*, 2 l.	2	20·0	250	224
" "	Pandora	2200	305	36¾	13½	7000 T.	Portsm'th	Portsm'th	1900	1901	173,216							
" "	Pegasus	2135	300	36½	17	7000 R.	Jarrow	Palmer	1897	1899	141,252							
" "	Pelorus	2135	300	36½	17	7000 Nor.	Sheerness	Thomson	1896	1897	..							
" "	Perseus	2135	300	36½	13½	7000 T.	Hull	Earle	1898	1901	138,264							
" "	Pioneer	2200	305	36¾	13½	7000 T.	Chatham	Fairfield	1899	1900	154,480							
" "	Pomone	2135	300	36½	13½	7000 Bl.	Sheerness	Penn	1897	1900	154,968							
" "	Prometheus	2135	300	36½	13½	7000 T.	Hull	Earle	1898	1901	135,916							
" "	Psyche	2200	305	36¾	17½	7000 T.	Devonp'rt	Devonport	1898	1900	160,963							
" "	Proserpine	2135	300	36½	17	7000 T.	Sheerness	Devonport	1896	1899	170,780							
" "	Pyramus	2135	300	36½	13½	7000 R.	Jarrow	Palmer	1898	1900	141,008							
3rd cl. Cr.	Philomel	2575	265	41	15½	7500	Devonp'rt	Earle	1890	1892	163,699	2–1	2	8 *4·7-in.*, 8 *3-pr.*, 4 M., 1 l.	2	19·0	300	217
" "	Phœbe	2575	265	41	15½	7500	Devonp'rt	Devonport	1890	1892	168,751							
Sloop	Phœnix shd.	1050	185	32½	11¼	1400	Devonp'rt	Devonport	1895	1896	68,630	..	·22	6 *4-in.*, 4 *3-pr.*, 3 M.	..	13·0	160	106
3rd cl. Cr.	Pique shd.	3600	300	43¾	17½	9000	Jarrow	Palmer	1890	1893	193,341	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·75	400	273
3rd cl. Cr.	Porpoise	1770	225	36	14½	3500	Glasgow	Thomson	1886	1888	98,182	..	..	6 *6-in.* Q.F.C., 8 *3-pr.*, 2 M., 1 l.	3	16·5	475	172
1st cl. Cr.	Powerful* shd	14,200	500	71	29	25,000 B.	Barrow	Barrow	1895	1898	741,870	3–6	6	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 8 *3-pr.*, 9 M., 2 *12-pr.* boat.	4	22·1	1500 / 3000	840
3rd cl. Cr.	Pylades	1420	200	38	15¾	1400	Sheerness	Laird	1884	1886	..	1¼	..	14 *5-in.*, 8 M., 1 l.	..	12·6	400	170
3rd cl. Cr.	Racoon	1770	225	36	13½	4500	Devonp'rt	Harland	1887	1888	120,507	..	..	6 *6-in.* Q.F.C., 8 *3-pr.*, 2 M., 1 l.	3	17·5	475	176
2nd cl. Cr.	Rainbow shd.	3600	300	43¾	17½	9681	Jarrow	Palmer	1891	1893	192,794	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·7	400	273
1st cl. G. B.	Rattler	715	165	29	11	1200	Elswick	Hawthorn.	1886	1888	41,343	..	..	6 *4-in.*, 4 M.	..	13·6	105	76
T. G. B.	Rattlesnake	550	200	23	8	2700	Birkenh'd	Laird	1886	1888	37,328	..	..	1 *4-in.*, 6 *3-pr.*	4	18·5	100	67
1st cl. G. B.	Redbreast	805	165	31	11½	1200	Pembroke	Earle	1888	1890	45,630	..	..	6 *4-in.*, 4 M.	..	13·0	105	76
" "	Redpole										45,575							
2nd cl. G. B.	Redwing	461	125	23½	10	360	Pembroke	Maudslay	1880	1881	..	..	..	2 *20-cwt.*, 2 M.	..	9·68	40	..
T. G. B.	Renard	810	230	27	8¾	3500	Birkenh'd	Laird	1892	1894	56,035	..	2	2 *4·7-in.*, 4 *3-pr.*	3	19·25	100	91
3rd cl. Cr.	Retribution shd.	3600	300	43¾	17½	9000	Jarrow	Palmer	1891	1893	192,761	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·75	400	275

* Refitted by Vickers, of Barrow.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
Sloop	Rinaldo	980	180	33	11½	1400 B.	Laird	Laird	1901	1902	67,231	..	..	6 *4-in.*, 4 *3-pr.*	..	13·25	130	130
3rd cl. Cr.	Ringarooma (Australia)	2575	265	41	15½	7500	Glasgow	Thomson	1890	1891	135,673	2–1	2	8 *4·7-in.*, 8 *3-pr.*, 4 M., 1 l.	4	19·0	300	216
1st cl. Cr.	Royal Arthur shd.	7700	360	60	27¾	12,000	Portsm'th	Maudslay	1891	1893	427,620	5–1	6	1 *9·2-in.*, 12 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 7 M., 2 l.	4 (2 sub.)	19·7	850	567
Sloop	Rosario shd.	980	180	33	11½	1400 B.	Sheerness	Governm't	1898	1900	81,662	..	..	6 *4-in.*, 4 *3-pr.*	..	13·25	130	130
1st cl. Cr.	St. George.* shd.	7700	360	60¾	23¾	12,000	Hull	Maudslay	1892	1894	407,540	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 7 M., 2 l.	4 (2 sub.)	19·7	850	559
T. G. B.	Salamander	735	230	27	8¼	3500 M.	Chatham	Maudslay	1889	1890	59,580	..	2	2 *4·7-in.*, 4 *3-pr.*	3	20·0	100	91
" "	Sandfly	525	200	23	8¾	2700	Devonp'rt	Maudslay	1887	1888	47,927	..	·22	1 *4-in.*, 6 *3-pr.*	4	19·0	80	67
3rd cl. Cr.	Sapphire	3000	360	40	14½	9800	Palmer	Palmer	1904	..	231,040	..	..	12 *4-in.*, 8 *3-pr.*	..	21·75	300	296
" "	Sappho	3400	300	43	16½	9861	Poplar	Penn	1891	1893	181,369	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	20·47	400	273
" "	Scylla	3400	300	43	16½	9280	Poplar	Penn	1892	1893	181,010	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	20·62	400	273
T. G. B.	Seagull	735	230	27	8¼	3500 Nic.	Chatham	Maudslay	1889	1890	60,332	..	2	2 *4·7-in.*, 4 *3-pr.*	3	20·0	100	91
" "	Sharpshooter	735	230	27	8¼	3500 B.	Devonp'rt	Bellis	1888	1889	56,955	..						
Scout	Sentinel	2900	360	40	14¼	17,000 E.	Barrow	Vickers	1904	..	281,814	1½–⅝	..	10 *12-pr.*, 8 *1½-pr.*	2	25	165 380	268
3rd cl. Cr.	Severn	4050	300	46	19	6000	Chatham	Humphrys	1885	1888	264,924	3–2	4	2 *8-in.*, 10 *6-in.*, 3 *6-pr.*, 2 *3-pr.*, 10 M., 2 l	..	17·3	900	327
Sloop	Shearwater shd.	980	180	33	11½	1400 B.	Sheerness	Thames Co.	1901	1901	69,120	..	..	6 *4-in.*, 4 *3-pr.*	..	13·25	130	130
T. G. B.	Sheldrake	735	230	27	8¼	3500 B.&W.	Chatham	Maudslay	1889	1890	59,555	..	2	2 *4·7-in.*, 4 *3-pr.*	3	20·5	100	91
Scout	Skirmisher	2900	360	40	14¼	17,000 Vic. Ex.	Barrow	Vickers	Bldg.	..	..	1½–⅝	..	10 *12-pr.*, 8 *1½-pr.*	2	25	420	268
T. G. B.	Skipjack	735	230	27	8¼	6000 R.	Chatham	Laird	1889	1890 1899	61,225	..						
" "	Spanker	735	230	27	8¼	3920 Du T.	Devonp'rt	Bellis	1889	1890	57,031	..	2	2 *4·7-in.*, 4 *3-pr.*	3	20·5	100	91
" "	Speedwell*	735	230	27	8¼	6000 R.	Devonp'rt	Laird	1889	1890 1899	..	..						
1st cl. Cr.	Spartiate shd.	11,000	435	69	26	18,658	Pembroke	Maudslay	1898	1902	680,188	4–2½	4½–2	16 *6-in.*, 12 *12-pr.*, 3 *3-pr.*, 8 M., 2 l.	3 (2 sub.)	21·0 *t*	1000	600
3rd cl. Cr.	Sirius shd.	3600	300	43¾	17½	9000	Elswick	Maudslay	1890	1892	195,934	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	19·75	400	273
" "	Spartan shd.	3600	300	43¾	17½	9000	Elswick	Maudslay	1891	1893	195,302							
1st cl. G. B.	Sparrow	805	165	31	11½	1200	Greenock	Greenock	1889	1890	43,642	..	..	6 *4-in.*, 2 *3-pr.*, 2 M.	..	13·0	105	76
T. G. B.	Speedy	810	230	27	8¾	4703	Chiswick	Thornycrft	1893	1894	61,114	..	2	2 *4·7-in.*, 4 *3-pr.*	3	20·21	100	91
" "	Spider	525	200	23	8¾	T. 2700	Devonp'rt	Maudslay	1887	1888	48,189	..	0·22	1 *4-in.*, 6 *3-pr.*	4	19·0	80	67
D. V.	Surprise	1650	250	32½	14	3000	Jarrow	Palmer	1885	1887	85,457	..	..	4 *5-in.*, 4 *6-pr.*, 2 M.	..	17·0	400	114
2nd cl. G.V.	Swift	756	165	29	11	870	Blackwall	Rennie	1879	1881	..	..	..	2 *90-cwt.* M.L.R., 4 *6-pr.*, 2 M.	..	11·81	180	92

* Refitted by Messrs. Harland & Wolff.

GREAT BRITAIN.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Maker of Engines.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						£	in.	in.			knots.	tons.	
2nd cl. Cr.	Talbot . shd.	5600	350	53½	21	9600	Devonp'rt	Devonport	1895	1897	280,119	1½–3	3	11 *6-in.*, 9 *12-pr.*, 1 *3-pr.*, 4 M., 1 l.	3 (2 sub.)	20·0	550	433
3rd cl. Cr.	Tartar .	1770	225	36	14¼	3500	Glasgow .	Thomson .	1886	1888	100,592	..	..	6 *6-in.* Q.F.C., 8 *3-pr.*, 2 M., 1 l.	3	16·5	325	177
" "	Tauranga . (Australia)	2575	265	41	15½	7500	Glasgow .	Thomson .	1889	1891	135,698	2–1	2	8 *4·7-in.*, 8 *3-pr.*, 4 M., 1 l.	4	19·0	300	212
" "	Terpsichore .	3400	300	43	16½	9000	Glasgow .	Thomson .	1890	1892	182,626	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *6-pr.*, 1 *3-pr.*, 9 M., 1 l.	4	20·0	400	275
1st cl. Cr.	Terrible † . shd.	14,200	500	71	27	25,000 B.	Glasgow .	Thomson .	1895	1898	740,584	3–6	6	2 *9·2-in.*, 16 *6-in.*, 14 *12-pr.*, 8 *3-pr.*, 9 M., 2 *12-pr.* boat.	4	22·4	1500/3000	840
3rd cl. Cr.	Thames . .	4050	300	46	19½	5700	Pembroke	Penn .	1885	1888	260,845	3–2	4	2 *8-in.*, 10 *6-in.*, 3 *6-pr.*, 8 *3-pr.*, 6 M., 2 l.	2	16·8	900	326
cl. G. B.	Thistle .	700	180	33	8	1300 Y.	Glasgow .	London and Glasgow Co.	..	..	54,133	..	..	2 *4-in.*, 4 *12-pr.*	..	13·5	50	85
1st cl. Cr.	Theseus .	7350	360	60	23¾	12,000	Blackwall	Maudslay .	1892	1894	377,913	5–1	6	2 *9·2-in.*, 10 *6-in.*, 12 *6-pr.*, 5 *3-pr.*, 7 M., 2 l.	4 (2 sub.)	20·0	850	544
3rd cl. Cr.	Thetis .	3400	300	43	16½	9000	Glasgow .	Thomson .	1890	1892	182,431	2–1	2	2 *6-in.*, 6 *4·7-in.*, 8 *3-pr.*, 1 *3-pr.*, 4 M., 1 l.	4	20·0	400	273
" "	Tribune .	3400	300	43	16½	9000	Glasgow .	Thomson .	1891	1892	182,291							
1st cl. G. B.	Thrush .	805	165	31	11½	1200	Greenock	Greenock Fdy. Co.	1889	1890	43,642	..	..	6 *4-in.*, 2 *3-pr.*, 2 M.	..	13·0	105	76
3rd cl. Cr.	Topaze .	3000	360	40	14½	9800 L.N.	Birkenh'd	Laird .	Bldg.	..	247,697	..	..	12 *4-in.*, 8 *3-pr.*	..	21·75	300	296
Sloop	Torch . shd.	960	180	32½	11½	1400	Sheerness	Sheerness .	1894	1896	65,064	..	..	6 *4-in.*, 4 *3-pr.*, 2 M.	..	13·25	130	101
2nd cl. Cr.	Venus . shd.	5600	350	54	21¼	9600	Fairfield .	Fairfield .	1895	1898	270,390	2½	3	11 *6-in.*, 9 *12-pr.*, 7 *3-pr.*, 4 M., 1 l.	3 (2 sub.)	19·5	550	470
Sloop	Vestal . shd.	980	180	33	11½	1400 B.	Sheerness	Governm't	1901	1901	78,021	..	..	6 *4-in.*, 4 *3-pr.*	..	13·25	130	130
2nd cl. Cr.	Vindictive .	5800	320	54	20½	10,000 B.	Chatham	Chatham .	1896	1899	293,434	1–2 N.S.	3	10 *6-in.* Q.F., 9 *12-pr.*, 3 *3-pr.*, 5 M., 1 l.	2	19·5	500	450
T. D. S.	Vulcan .	6620	350	58	23	12,032	Portsm'th	Humphrys	1889	1894	380,831	5–2½	2	8 *4·7-in.*, 12 *3-pr.*, 16 M., 1 l.	6 (2 sub.)	20·0	1000	433
3rd cl. Cr.	Wallaroo . (Australia)	2575	265	41	15½	7500	Elswick	Hawthorn .	1889	1891	123,592	2–1	2	8 *4·7-in.*, 8 *3-pr.*, 4 M., 1 l.	4	19·0	300	218

† Refitted by John Brown, Clydebank.

River Gunboats.—Herald, Mosquito (1890), 82 tons; Jackdaw, Heron, Robin, Nightingale, Snipe (1897), 85 tons; Woodcock, Woodlark (1897), 122 tons, 2 6-prs., 4 Maxims; Teal, Moorhen (1901), 180 tons, 2 6-prs., 13 knots; 4 recent boats in the Niger Protectorate. Recent Egyptian boats: Melik, Sultan, Sheik, 140 tons, 4 12-prs., 4 Maxims.

Royal Naval Reserved Merchant Cruisers.

—	Name.	Owners.	Length.	Breadth.	Draught of Water for the Admiralty List.	Gross Tonnage.	Indicated Horse-Power.	Ocean Speed.
			Feet.	Feet.	Feet.	Tons.		Knots.
Ships in receipt of an annual subvention and permitted to fly the blue ensign.	Caledonia	Peninsular and Oriental Co.	486	54¼	26¾	7,558	10,000	18½
	Persia	” ” ”	500	54¼	26¼	7,951	9,400	18
	Arabia	” ” ”	500	54¼	26¾	7,930	9,400	18
	India	” ” ”	500	54¼	26¾	7,911	9,400	18
	Two new ships	Cunard Co.	760	80	..	..	60,000	24½
	Umbria	”	501½	57	26	8,120	14,500	19½
	Campania	”	610	65	26	12,950	30,000	21
	Lucania	”	610	65	26	12,950	30,000	21
	Teutonic	White Star Line	582	58	24½	9,984	16,000	20
	Majestic	” ”	582	58	24½	10,147	16,000	20
	Oceanic	” ”	705½	68¼	49½	17,274	26,500	21
	Danube	Royal Mail Steam Pokt. Co.	420	52	23	5,946	6,650	17
	Nile	” ” ”	420	52	23½	5,946	6,650	17
	Omrah	Orient Steam Nav. Co.	490¾	56¾	24	8,291	10,000	18
	Ophir	” ” ”	465	53½	25	6,910	10,000	18
	Ortona	Pacific Steam Nav. Co.	500	55¼	33½	7,945	10,000	17
	Empress of India	Canadian Pacific Rlwy. Co.	440	51	24½	5,905	10,000	16
	Empress of China	” ” ”	440	51	24½	5,905	10,000	16
	Empress of Japan	” ” ”	440	51	24½	5,905	10,000	16
	Valetta	Peninsular & Oriental Co.	420½	45	22½	4,904	5,000	15
	Massilia	” ” ”	420½	45	22½	4,902	5,000	15
	Rome	” ” ”	430	44½	22½	5,545	5,500	15
	Carthage	” ” ”	430	44½	22½	4,379	5,000	15
	Ballarat	” ” ”	420	43	22½	4,778	4,500	14
	Parramatta	” ” ”	420	43	22½	4,756	4,500	14
	Peninsular	” ” ”	410½	48	27	5,287	4,972	15
	Oriental	” ” ”	410½	48	27	5,284	4,972	15
	China	” ” ”	500½	54¼	27	7,912	9,400	18
	Egypt	” ” ”	500	54¼	26¾	7,912	9,400	18
	Victoria	” ” ”	466	52	22½	6,091	7,000	16
Ships held at the disposition of the Admiralty without subsidy.	Britannia	Peninsular and Oriental Co.	466	52	22½	6,525	7,000	16
	Oceana	” ” ”	466	52	22½	6,188	6,000	16
	Himalaya	” ” ”	465½	52	22½	6,898	10,000	17
	Australia	” ” ”	465½	52	22½	6,901	10,000	17
	Arcadia	” ” ”	466	52	22½	6,188	7,000	16
	Ivernia	Cunard Co.	582	65	31¾	13,800	10,000	16
	Saxonia	”	580	64¼	32	13,800	10,000	16
	Carpathia	”	558	64½	31¼	13,564	8,250	15
	Sylvania	”	460	49	27	5,598	4,250	13
	Ultonia	”	513	57¼	29¼	10,402	5,500	13
	Caronia (building)	”	675	72¼	..	21.000	21,000	18
	Etruria	”	501½	57	26	8,128	14,500	19½
	Aurania	”	470	57	27	7,269	9,500	17
	Germanic	White Star Co.	468	45	25	5,071	6,000	16
	Suevic	” ”	565½	63¼	44	12,550	4,600	12
	Gothic	” ”	504	53¼	37	7,755	4,400	14
	Cymric	” ”	599½	64	41	13,096	6,700	16
	Medic	” ”	565	63¼	..	11,985	4,900	12
	Ormuz	Orient Steam Nav. Co.	465½	52	26	6,387	9,000	18
	Orient	” ” ”	445½	46¼	26	5,631	8,000	16
	Thames	Royal Mail Steam Pckt. Co.	436	50¼	22¼	5,645	5,740	17
	Clyde	” ” ”	436	50¼	22½	5,645	5,740	17
	Tagus	” ” ”	410	50	23	5,545	5,740	17
	Trent	” ” ”	410	50	23	5,545	5,740	17
	Magdalena	” ” ”	421	50	22¼	5,362	5,600	17
	Atrato	” ” ”	421	50	20½	5,366	5,600	17
	Orizaba	Pacific Steam Nav. Co.	460	49¼	35¼	6,298	8,500	15½
	Oroya	” ” ”	460	49¼	35¼	6,297	7,500	15½
	Oravia	” ” ”	421	48¼	33	5,321	5,700	15½
	Tartar	Canadian Pacific Rly. Co.	376	47	33¼	4,425	..	..
	Athenian	” ” ”	365	45½	29	3,382	..	..

The agreement with the Peninsular & Oriental Co. terminates on December 15, 1905, that with the Cunard Co. on March 24, 1906, that with the White Star Co. on December 4, 1905, that with the Orient Co. on September 22, 1905, that with the Royal Mail Steam Packet Co. on March 18, 1906, that with the Pacific Steam Navigation Co. on October 24, 1905, and that with the Canadian Pacific Co. in July, 1904.

GREAT BRITAIN, COLONIES, &c.—Cruising Ships, Gunboats, &c.

To what Government belonging.	Class of Ship.	Name.	Material of Construction.	Propellers.	Where Built.	When Launched.	Length.	Breadth.	Draught of Water.	Displacement.	Indicated Horse-Power.	Speed.	Coal Stowage.	Armament.
							ft. in.	ft. in.	ft. in.				tons.	
INDIA	C. D. S.	Abyssinia	..	..	Poplar	1870	225 0	42 0	14 6	2900	900	9·0	92	4 *8-in. 14-ton*, 7 M., 2 l.
INDIA	D. V.	Lawrence	Steel	Pad.	B'kenh'd	1886	212 2	32 2	18 3	1154	1277	13·5	270	4 *4-in.* B.L.R., 4 *6-pr.* Q.F., 4 M.
INDIA	C. D. S	Magdala	..	..	Blackwll	1870	225 0	45 0	15 3	3340	1400	10·0	120	4 *8-in. 14-ton*, 7 M., 2 l.
QUE'NSLAND.	Gun-vessel	Gayundah	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	400	10·0	..	1 *8-in.* *11½-ton*; 1 *6-in. 4-ton*; 1 *3-pr.* Q.F.; 2 M.
QUE'NSLAND.	Gun-vessel	Paluma	Steel	2	Glasgow	1884	115 0	25 0	10 0	450	340	10·0	..	1 *8-in.* *11½-ton*; 1 *6-in. 4-ton*; 1 *3-pr.* Q.F.; 2 M.
SOUTH AUSTRALIA	Cruiser	Protector	Steel	2	..	1884	188 0	3 0	12 6	920	1640	14·0	..	1 *8-in.* *11½-ton*; 5 *6-in. 4-ton*; 5 Gatlings.
VICTORIA	C. D. S.	Cerebus	..	..	Jarrow	1868	225 0	45 0	15 3	3480	1660	9·75	120	4 *10-in. 18-ton* M.L.R., 4 M.

The five second-class Cruisers, and the two Torpedo-Gunboats of the Australian Auxiliary Squadron are included in the list of ships of the Royal Navy.

ARGENTINE REPUBLIC.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.b.	Almirante Brown .	4267	240	50	20½	4500	Poplar .	1880	1882	270,000	9 comp.	1½	8 comp.	7 comp.	8 comp.	..	10 5·9-in. (Canet), 4 4·7-in., 8 2·4-in., 2 M.	2	13·75 t	650	350
c.d.s.t.	Andes . . .	1558	186	44	9½	750	Birkenhead .	1875	1877	85,600	6	1	..	..	9	..	2 8-in., 4 M.	..	9·5	120	120
a.c.	Garibaldi . .	6732	328	59¾	24	13,384	Sestri Ponente	1895	1896	752,000	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 10-in., 10 6-in., 6 4·7-in., 10 2·2-in., 10 1·4-in., 2 M.*	..	19·9 t	1000	500
a.c.	General Belgrano .	7069	328	59¾	24	13,000	Leghorn .	1897	1899	696,700	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	2 10-in., 14 6-in., 2 3-in., 10 2·2-in., 8 1·4-in., 2 L., 2 M.	4 sub.	20·1 t	1000	500
a.c.	General San Martin	6773	328	59¾	24	13,000	Leghorn .	1896	1898	688,200	6–3 H.S.	1½	6 H.S.	6 H.S.	6 H.S.	6 H.S.	4 8-in., 10 6-in., 6 4·7-in., 12 2·2-in., 10 1·4-in., 2 L., 2M.*	4 sub.	19·8	1100	500
c.d.s.b.	Independencia .	2336	230	44¼	13	3000	Birkenhead .	1891	1893	176,000	8 comp.	2	..	8 comp.	8 comp.	..	2 9·4-in., 4 4·7-in. (A). 4 3-pr. (A), 4 M.	2	14·4 t	340	225
c.d.s.b.	Libertad . . .	2336	230	44¼	13	3000	Birkenhead .	1890	1892	176,000											
c.d.s.t.	Plata . . .	1558	186	44	9½	750	Birkenhead .	1874	1877	85,600	6	1	..	..	9	..	2 8-in., 2 2-in., 4 M. . . .	..	9·5	120	120
a.c.	Pueyrredon . .	6773	328	59¾	24	13,000 B.	Sestri Ponente	1898	1901	782,000	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	2 10-in., 10 6-in., 6 4·7-in., 10 2·2-in., 10 1·4-in., 2 M.*	4 sub.	20·1 t	1000	500

* Garibaldi, General San Martin, General Belgrano and Pueyrredon have Armstrong guns.

The armoured cruisers Moreno and Rivadavia have been sold to Japan and renamed Nisshin and Kasuga.

ARGENTINE REPUBLIC.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
											Deck.	Gun Position.	Guns.	Torpedo Tubes.			
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.v.	Argentina	807	192	27	13	850	Trieste	1883	1884	25,500	..	..	1 *6-in.*, 6 *2·7-in.* (K.), 4 M.	..	12·0	220	120
cr.	Buenos Aires shd.	4780	396	47¼	19	17,000	Elswick	1895	1895	383,000	5	4½	2 *8-in.* (A.), 4 *6-in.*, 6 *4·7-in.*, 16 *3-pr.*, 6 *1-pr.*	5	23·2* *t*	1000†	429
to.g.b.	Espora	520	210	25	8	3500	Birkenhead	1890	1891	..	..	..	3 *3-in.*, 4 *3-pr.*, 2 M.	5	20·0	100	124
cr.	Nueve de Julio	3570	354	44	19½	14,350	Elswick	1892	1892	293,000	4½	4½	4 *6-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 12 *1-pr.*	5	22·74 *t*	770†	300
cr.	Patagonia	1419	220	32¾	12¾	2400	Trieste	1885	1887	100,000	1½	4	1 *10-in.*, 3 *6-in.*, 6 l., 10 M.	..	13·0	350	210
to.g.b.	Patria	1070	250	31	10	4500	Birkenhead	1893	1894	87,000	..	..	2 *4·7-in.*, 4 *8-pr.*, 2 *3-pr.*, 2 M.	5	20·75 *t*	288	159
g.v.	Paraná	550	142¾	25	11¾	475	Birkenhead	1874	1876	..	..	..	2 *6-in.*, 2 *4·7-in.*	..	11·0	..	..
g.v.	Uruguay	550	142¾	25	11¾	475	Birkenhead	1874	1876	..	..	..	2 *6-in.*, 2 *4·7-in.*	..	11·0	..	..
cr.	25 de Mayo	3200	325	43	16	13,800	Elswick	1890	1892	260,000	4½	4½	2 *8·2-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 12 *1-pr.*	6	22·43 *t*	600†	185

* Natural draught. † Bunker capacity.

The training-ship (cruiser), Presidente Sarmiento, 2750 tons, 2000 I.H.P. (Niclausse boilers), and 13 knots speed, with 19 guns and three torpedo tubes; launched by Messrs. Laird, 1897. There are several other small gunboats; also the torpedo-ram Maipù (1063 tons, 1750 I.H.P.), built in England in 1880. The Florio Company sold to the Argentine Government the steamships Arno, Regina Margherita, and Sempione to be converted into cruisers; and the Spanish firm of Pinillos, Salny & Co., the Barcelona (4020 tons register), and Cadiz (4218 tons), which have been re-named Pampa and Gaucho.

AUSTRIA-HUNGARY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		metric tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	“B.” (Ersatz Drache) “C.”	10433	390½	72¼	24½	14,000 Y.	Trieste	Bldg. Pro.	..	912,500	8¼ K.S.	2	5 K.S.	8 K.S.	9 K.S.	6 K.S.	4 9·4-*in.*, 12 7·5-*in.*, 16 2·8-*in.*, 16 M.	2 (sub)	19·0	1315	..
c.d.s.b.	Arpad Babenberg	8208	354¼	65¾	23¼	15,000 B.	Trieste	1901 1902	1903 1904	650,900 667,000	8½ K.S.	2½	4 K.S.	8 K.S.	8¼ K.S.	5 K.S.	3 9·4-*in.*, 12 5·9-*in.*, 24 smaller.	..	19·6 *t*	500 840	..
c.d.s.	Budapest	5462	305	55¾	21	9185 B.	Trieste	1896	1897	400,600	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 9·4-*in.*, 6 5·9-*in.*, 14 1·8-*in.*	4	17·8 *t*	500	450
c.b.	Custoza	7060	302¼	58	24½	4440	Trieste	1872	1875	414,400	9–5	1½	7	6	7	..	8 10·2-*in.* (K.), 11 Q.F., 8 l.	2	14·0	584	567
c.b.	Don Juan de Austria	3550	240¼	50	20	2700	Trieste	1875	1877	..	8–4	1	6	4¾	6	..	8 8·2-*in.* (K.), 11 Q.F. & M., 6 l.	4	13·0	380	440
c.d.s	Erzherzog Albrecht	5846	285¼	56¼	22	3600	Trieste	1872	1875	357,600	9–5	1½	..	..	7	..	8 9·4 *in.* (K.), 11 Q.F., 8 l.	2	13·0	453	535
b.	Erzherzog Karl	10433	390½	72¼	24½	14,000 Y.	Trieste	1903	..	912,500	8¼ K.S.	2	5 K.S.	8 K.S.	9 K.S.	6 K.S.	4 9·4-*in.*, 12 7·5-*in.*, 16 2·8-*in.*, 16 M.	2 (sub)	19·0	1315	..
b.	Habsburg	8208	354¼	65¾	23¼	15,000 B.	Trieste	1900	1902	626,000	8½ H.S.	2½	4 H.S.	8 H.S.	8¼ H.S.	5 H.S.	3 9·4-*in.*, 12 5·9-*in.*, 24 smaller.	..	19·6 *t*	500 840	..
a.c.	Kaiserin Maria Theresia	5187	351	52½	21¼	9755	Trieste	1893	1895	304,187	4	2	..	4	4	4	2 9·4-*in.*, 8 5·9-*in.*, 18 1·8-*in.*, 2 2·7-*in.*, 2 M.	4	19·0	740	450
a.c.	Kaiser Karl VI.	6151	367½	56	20¼	12,800 B.	Trieste	1898	1900	429,000	10 H.S.	1½	6 H.S.	8 H.S.	8¾ H.S.	6 H.S.	2 9·4-*in.*, 8 5·9-in., 18 1·8-*in.*, 2 M.	4	20·7 *t*	800	450
c.b.	Kaiser Max	3510	240¼	50	20	2700	Trieste	1875	1878	211,600	8–4	1	6	4¾	6	..	8 8·2-*in.* (K.), 11 Q.F. & M., 6 l.	4	13·0	380	440

AUSTRIA-HUNGARY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position. Heavy Guns.	Second-ary.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
Riv. Mon.	Körös	437	177	29½	4	1250	Buda Pesth	1892	1893	..	2	¾	..	..	3	..	2 *4·7-in.*, 2 l., 1 M.	..	10·0	..	..
b.	Kronprinz Rudolph	6830	295	62¼	25¼	7500	Pola	1887	1890	330,000	12–10	2½	..	10	10	..	3 *12-in.* (K.), 6 *4·7-in.*, 11 smaller & M., 2 l.	4	16·0	600	492
”	Kronprinzessin Stephanie	5069	278¾	55¾	21½	8300	Trieste	1887	1890	300,000	9 *comp.*	1	..	..	8 *comp.*	..	2 *12-in.* (K.), 6 *5·9-in.*, 11 Q.F. & M., 2 l.	4	17·0	400	510
Riv. Mon.	Leitha	305	166	27½	3½	700	Buda Pesth	1871	1872	20,000	1½	1	..	..	2	..	1 *4·7-in.*, 2 M.	..	8·0	20	54
”	Maros																				
c.d.s.	Monarch	5550	305	55¾	21	8900	Pola	1895	1898	399,062	10½ H.S.	2½	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 14 *1·8-in.*, 2 M.	4	17·4 *t*	500	450
c.b.	Prinz Eugen	3510	240½	50	20	2700	Pola	1877	1880	..	8–4	1	6	4¾	6	..	8 *8·2-in.* (K.), 11 Q.F. & M., 6 l.	4	13·0	380	440
a. c.	St. Georg	7185	383¾	61¾	21¼	12,300 Y.	Pola	1903	..	581,583	8¼–6½ K.S.	1½	5 K.S.	7 K.S.	8¼–5¼ K.S.	6 K.S.	2 *9·4-in.*, 5 *7·5-in.*, 4 *5·9-in.*, 25 smaller.	..	21·0	..	..
Riv. Mon.	Szamos	437	177	29½	4	1250	Buda Pesth	1892	1893	..	2	¾	..	..	3	..	2 *4·7-in.*, 2 Q.F., 1 M.	..	10·0	..	..
”	Save	433	184	30¾	4	1400	Neupesth	Bldg.	..	..	..	..	..	..	..	..	2 *4·7-in.*, 1 *4·7-in.* howitzer, 4 M.	..	11·0	..	..
”	Theiss																				
c.b.	Tegetthoff	7390	287	71	24¾	8800	Trieste	1878 1893	1881	..	14–9	3	14	12	14	..	6 *9·4-in.* (K.), 5 *5·9 in.*, 15 smaller do., 2 M.	4	16·3 *t*	670	578
c.d.s.	Wien	5550	305	55¾	21	8480	Trieste	1895	1897	397,850	10½ H.S.	2½ H.S.	3¼ H.S.	8 H.S.	10½ H.S.	3¼ H.S.	4 *9·4-in.*, 6 *5·9-in.*, 14 *1·8-in.*, 2 M.	4	17·6 *t*	500	450

Five patrol boats (30 tons, 2000 H.P.) are in hand for the Danube, two of them fitted with Parsons' turbines.

AUSTRIA-HUNGARY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to. cr.	Aspern	2362	301¾	39½	14¼	7300 Y	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 8 *1·8-in.*	1	20·0	470/500	242
to. g. b.	Blitz	354	193½	22¼	8	3500	Elbing	1888	1899	..	..	..	9 Q.F.	..	21·0	250	61
cr. 3rd cl.	Donau	2307	230	42¾	19¾	1800	Pola	1893	1895	..	..	..	10 *4·7-in.* (Uchatius), 4 M., 1 l.	..	12·0	320	311
cr. 2nd cl.	Kaiserin Elizabeth	4000	321½	47½	18½	9000	Pola	1890	1892	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 11 Q.F., 2 l.	5	19·0	660	450
cr. 2nd cl.	Kaiser Franz Josef I.	3966	321½	47½	18½	9000	Trieste	1889	1891	..	2¼	3½	2 *9·4-in.* (K.), 6 *5·9-in.* do., 11 Q.F., 2 l.	5	19·0	660	450
to. g. b.	Komet	354	193½	22¼	8	3500	Elbing	1888	1889	..	..	..	9 Q.F.	..	21·0	50	61
cr. 3rd cl.	Leopard	1506	224	34	14	6000	Elswick	1886	1888	200,000	..	..	2 *4·7-in.*, 10 smaller & M.	4	18·3	250	148
to. g. b.	Lussin	995	200¼	26½	12¼	1830 Dürr.	Trieste	1883	1885	..	1½	..	2 *5·9-in.* (K.), 7 M., 1 l.	..	14·0	200	142
to. g. b.	Magnet	502	219¾	26¾	8	5000 T	Elbing	1896	1899	51,052	..	..	6 *1·8-in.*	3	26·0 t	105	76
to. g. b.	Meteor	344	187	22¼	8	3500	Elbing	1887	1889	..	..	..	9 Q.F.	1	23.1	120	61
cr. 3rd cl.	Panther	1506	224	34	14	6000	Elswick	1885	1887	..	..	..	2 *4·7-in.*, 10 smaller & M.	4	18·5	250	148
T. D. S.	Pelican	2431	279	39½	15½	4600	Elbing	1891	1893	..	..	..	2 *5·9-in.* (K.), 8 smaller	4	18·0	..	..
to. g. b.	Planet	492	210	23	8¼	3500	Jarrow	1889	1890	..	..	..	10 Q.F.	1	19·6	78	78
to. g.b.	Satellit	531	220½	26¾	9¼	4000	Elbing	1893	1893	..	1½	..	9 Q.F.	..	21·87	76	61
to. cr.	Szigètvár	2313	301¾	39½	14¼	7300 Y.	Pola	1899	1901	155,000	2	..	8 *4·7-in.*, 12 *1·8-in.*	1	20·0	470/500	242
to. cr.	Tiger	1649	233	32¾	15⅜	5260	Trieste	1887	1889	..	..	..	4 *4·7-in.*, 10 smaller	..	18·0	300	190
to. g. b.	Trabant	522	210	23	8¼	3500	Trieste	1890	1891	..	..	..	10 Q.F.	1	20·0	..	61
to. v.	Zara	837	179½	26¼	12¼	1200	Pola	1879	1880	..	..	..	7 Q.F., 5 l.	..	14·0	150	142
to. cr.	Zenta	2264	301¾	39½	12¼	7300 Y.	Trieste	1897	1899	143,780	2	..	8 *4·7-in.*, 12 *1·8-in.*, 2 M.	1	20·9 t	470/500	242

Four screw gunboats, between 540 and 870 tons displacement and 250 and 950 indicated horse-power.

BRAZIL.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t. River	Alagoãs .	335	120	28	$4\frac{3}{4}$	180	Brazil .	1886	1888	..	$4\frac{1}{2}$	$4\frac{1}{2}$	..	..	$4\frac{1}{2}$	..	1 7-*in.* M.L.R. (Whitworth), 2M.	..	7·0	..	43
t.	Aquidaban shd.	4950	280	52	18	6200	Poplar	1885 1897	1887	345,000*	11 *comp.*	2	..	10 *comp.*	10 *comp.*	..	4 9·4-*in.* (Canet), 4 5·5-*in.*, 2 smaller, 13 M.	5	15·0	600	350
t. River	Maranhao .	463	137	$34\frac{1}{2}$	$6\frac{1}{2}$	700	Rio de Janeiro	1890	1892	..	5 H.S.	..	..	..	..	..	2 4·7-*in.*, 1 2·5-*in.*, 5 M. .	..	12·0	..	..
c.d s., t. / c.d.s., t.	Marshal Deodoro / Marshal Floriano	3112	$267\frac{1}{2}$	48	$13\frac{1}{4}$	3400	La Seyne D'A.	1898 / 1899	1900 / 1901	..	$13\frac{3}{4}$–4 H.S.	$1\frac{1}{2}$	..	..	8 H.S.	3 H.S.	2 9·4-*in.*, 2 5·9-*in.* howitzers, 4 4·7-*in.*, 2 M., 4 6-*pr.*, 2 1-*pr.*	2 (sub.)	15·0	236	200
t. River	Pará . .	463	137	$34\frac{1}{2}$	$6\frac{1}{2}$	700	Rio de Janeiro	1890	1892	..	5 H.S.	..	..	..	..	..	2 4·7-*in.*, 1 2·5-*in.*, 5 M. .	..	12·0	..	..
t. River	Piauhy .	335	120	28	$4\frac{3}{4}$	180	Brazil	1887	1889	..	$4\frac{1}{2}$	$4\frac{1}{2}$	..	..	$4\frac{1}{2}$	..	1 7-*in.* M.L.R. (Whitworth)	..	7·0	..	43
t.	Riachuelo shd.	5700	305	52	$19\frac{1}{2}$	7300	Poplar	1883 1895	1888	365,000*	11 *comp.*	2	..	10 *comp.*	10 *comp.*	..	4 9·2-*in.* (Whitworth, altered by Armstrong), 6 4·7-*in.*, 2 3-*pr.*, 15 M.	5	16·71	800	450
t. River	Rio Grande .	335	120	28	$4\frac{3}{4}$	180	Brazil	1888	1890	..	$4\frac{1}{2}$	$4\frac{1}{2}$	..	..	$4\frac{1}{2}$	..	1 7-*in.* M.L.R. (Whitworth)	..	7·0	..	43

* Exclusive of guns and ammunition.

Floating batteries, Brazil (1518 tons) and Lima-Barros (1444 tons).

BRAZIL.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
cr.	Almirante Tamandare shd.	4660	294	46	18¼	7500	Brazil	1890	1893	..	1½	3	10 *6-in.*, 2 *4·7-in.*, 8 M.	8	17·0	750	450
,,	Andrada . . . shd.	2559	252¾	34	18	3600	Bergen	1890	1892	..	..	..	2 *4·7-in.*, 2 *14-pr.*, 6 *6-pr.*, 6 *1-pr.*	5	17·0	..	300
,,	Barroso . . . shd.	3600	330	43¾	16¾	7500	Elswick	1896	1897	..	3	4½ shields	6 *6-in.*, 4 *4·7-in.*, 10 *6-pr.*, 4 *1-pr.*, 4 M.	3	20·0	700	300
,,	Benjamin Constant . shd.	2707	236	46	18	2800	La Seyne	1892	1894	..	2	..	4 *6-in.*, 8 *4·7-in.*, 8 M., 4 l.	4	14·0	260	287
to.cr.	Caramuru	1014	249½	30¾	10¼	6000	Kiel	1896	1897	..	½	..	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*	3	22·5	..	..
to.g.b.	Gustavo Sampaio . .	500	197	21	7¾	2500	Elswick	1893	1894	..	..	..	2 *20-pr.*, 4 *7-pr.*	3	18·0	150	95
,,	Paysandu	1870	200	41¼	16¼	3000	Brazil	1877	1879	..	..	..	9 *70-pr.* M.L.R. (Whitworth), 6 M., 2 l.	..	13·0	..	250
cr.	Primeiro de Março . .	715	167¼	26¼	10½	750	Brazil	1881	1883	..	..	..	7 *4·5-in.* M.L.R. (Whitworth). 4 M.	..	9·0	..	..
,,	Quinze de Novembro	1300	210	35	13	3300	Elswick	1892	1894	..	2–1	..	6 *4·7-in.*, 4 *6-pr.*, 6 M.	4	17·0	170	160
to.cr.	Tamoyo	1063	269	28¾	9¾	6500	Kiel	1898	1900	..	..	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	23·0	293	110
,,	Timbira	1014	249½	30¾	10¼	7000	Kiel	1896	1897	..	½	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110
g.v.	Tiradentes . . . shd.	800	165	30	11	1200	Elswick	1892	1893	..	..	..	4 *4·7-in.*, 3 *6-pr.*, 4 M.	2	14·5	110	107
to.cr.	Tupy	1014	249½	30¾	10¼	7000	Kiel	1896	1897	..	½	4½ shields	2 *3·9-in.*, 6 *2·2-in.*, 2 *1·4-in.*, 2 M.	3	22·5	250	110

Eleven screw gunboats, 200 tons to 400 tons, and eight paddle gunboats, 120 tons to 160 tons.

CHILI.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	‡ Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
c.b.	**Almirante Cochrane** shd.	3500	210	45¾	19¾	2920	Hull .	1874	1877	..	9	3	8	6	8	..	6 *8-in.* A., 4 *6-pr.*, 4 *3-pr.*, 7 M.	3	13·0	350	242
a.c.	**Almirante O'Higgins** shd.	8500	411¾	62½	22	16,000 B.	Elswick .	1897	1898	..	7–5	2	..	..	7½–6	6	4 *8-in.*, 10 *6-in.*, 4 *4·7-in.*, 10 *12-pr.*, 10 *6-pr.*, 4 M.	3 (2 sub.)	21·5 t	1260	..
b.	**Capitao Prat** . . shd.	5981	328	60¾	21¾	12,000	La Seyne	1890	1893	391,000	12	3	4	..	10½	2	6 *9·4-in.* (Canet), 8 *4·7-in.* (Canet), 6 *2·2-in.*, 4 *1·8-in.*, 10 *1·4-in.*, 5 M.	4	18·3 t	775	485
a.c.	**Esmeralda** . . .	7020	436	53¼	22¼	16,000	Elswick .	1896	1897	..	6 H.S.	2	..	6 H.S.	4½ Shields	..	2 *8-in.*, 16 *6-in.*, 8 *12-pr.*, 2 *3-pr.*, 4 M.	3 (2 sub.)	22·8 t	1350	500

The battleships Constitucion and Libertad, built at Elswick and launched in 1903, have been sold to the British Government and renamed. It has been stated that the Capitão Prat will be disposed of to Japan, as well as the protected cruiser Chacabuco.

Cruising Ships, &c.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
to.g.b "	**Almirante Condell** . **Almirante Lynch** .	750	240	27½	10½	4500 B.	Birkenhead .	1890	1892	..	..	..	3 *14-pr.*, 4 *3-pr.*, 2 M. .	5	21·0	210	..
"	**Almirante Simpson.** .	812	240	27½	10½	4700 N.	Birkenhead .	1896	1896	..	..	4½	2 *4·7-in.*, 4 *3-pr.* . .	3	21·0t	200	..
cr.	**Blanco Encalada** . shd.	4400	370	46½	18½	14,500	Elswick .	1893	1894	..	4–1¾	..	2 *8-in.*, 10 *6-in.*, 12 *3-pr.*, 10 *1-pr.**	5	22·78 t	†900	427
"	**Chacabuco** . . shd	4500	360	46	18‡	15,750	Elswick .	1901	1903	..	4½–1¾	..	2 *8-in.*, 10 *4·7-in.*, 16 *1·8-in.*, 2 M., 1 l.	5	23·0	1000 †	..
"	**General Baquedano** (Training)	2330	240	45¾	18‡	1500 B.	Elswick .	1898	1900	..	..	..	4 *4·7-in.*, 2 *12-pr.*, 2 *6-pr.*, 2 M., 1 l.	1	13·7 t.	200 / 300	302
"	**Ministro Zenteno** . shd.	3600	330¼	43¾	16¾	6500	Elswick .	1896	1898	..	..	..	8 *6-in.*, 10 *6-pr.*, 4 *1-pr.** .	3	20·0t	800	..
" "	**Presidente Errázuriz** **Presidente Pinto** . shd.	2047	268	35¾	19½	5400	La Seyne .	1890	1892	..	3½	..	4 *6-in.* (Canet), 2 *5-in.*, 4 *2·2-in.*, 6 M.	3	19·0	200	171

* Armstrong. † Bunker Capacity. ‡ Mean Draught. Two Gunboats of 145 tons displacement and one of 180 tons.

CHINA.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			kts.	tons.	
cr.	Foo-Ching . . .	2500	253	36¼	18	2400	..	1893	1895	..	4–2	4½	3 5-*in.* (K.), 4 M., 2 l. .	..	16·0	..	..
to.g.b.	Fei-Ying . . .	837	257¼	28½	12½	4500	Stettin .	1895	1895	..	..	2	2 4-*in.*, 6 3·4-*in.*, 4 smaller	3	21·8 t	75	90
cr.	Hai-Chi. . . .	4300	396	46¾	18½	Y. 17,000	Elswick .	1898	1899	..	5	6	2 8-*in.*, 10 4·7-*in.*, 12 3-*pr.*, 4 1·4-*in.*, 6 M.	5	24·0	300	374
,,	Hai-Shen . .							1898	1898								
,,	Hai-Shew . .	2903	314¾	41	16	8000	Vulcan . Stettin .	1897	1898	..	3	2	3 6-*in.*(K.), 8 4-*in.*, 6 1·4-*in.* Hotchkiss, 6 M.	3 (1 sub.)	20·7 t	220 500	244
,,	Hai-Yung . .							1897	1898								
,,	Hai-Tien . . .	4300	396	46¾	18½	17,000	Elswick .	1897	1899	..	5	6	2 8-*in.*, 10 4·7-*in.*, 12 3-*pr.*	5	24·1 t	300	374
,,	Hi-Ying . . .	2165	253	36¼	18	2400	..	1895	1897	..	..	..	2 8-*in.* (A.), 8 4·7-*in.*, 4 M..	1	21·0	..	..
to.cr.	Kien-Wei . .	861	256	26½	10½	7000 N.S.	Foochow	1900	1902	..	..	..	1 3·9-*in.*, 3 2·5-*in.*, 6 1·4-*in.*	2	22·5	360	300
,,	Kien-Gnan . .						Foochow	1899	1902	..	..	..					
cr.	King-Ching . . .	2100	250	36	20	2400	..	1886	1888	..	..	..	3 7-*in.* (K.), 7 40-*pr.*, 6 M. .	2	14·5	360	300
to.g.b.	Kwang-Ting . .	1000	235	27½	11¼	3400	..	1890	1892	..	..	..	3 4·7-*in.*, 4 M., 2 l. . .	4	16·0	..	120
cr.	Nan-Schuin . . .	2165	253	36¼	18	2400	Kiel . .	1884	1886	..	..	..	2 8-*in.* (A.), 8 4·7-*in.*, 9 M.	1	14·5	600	250
,,	Nan-Ting . . .	2165	253	36¼	18	2400	Kiel . .	1883	1885	..	..	..	2 8-*in.* (A.), 8 4·7-*in.*, 9 M.	1	15·0	600	250

Torpedo-gunboat Pei-Ting (349 tons), four gunboats of 411 tons, two of 300 tons, four of 215 tons (defence of Canton Roads), training vessel Tung-Chi, 1700 tons—all launched 1885–88. Huang Tái, cruiser, 2110 tons, sunk near Hong Kong through collision with the Canadian-Pacific mail-steamer Empress of India; captain and 13 of crew drowned.

DENMARK.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s.,t.	Gorm . .	2307	231	40	14	1670	Copenhagen	1870	1873	104,000	7–4½	..	..	..	8	..	2 *10-in.* (A.) M.L.R., 3 *3·4-in.* (K.), 4 M.	..	12·25	115	158
t.	Helgoland. .	5263	257½	59¼	18¾	4000	Copenhagen	1878	1881	275,000	12–6	4	10	7	10	..	1 *12-in.* (K.), 4 *10·2-in.*, 5 *4·7-in.*, 10 M.	4	12·0	230	350
c.d.s.,t.	Herluf Trolle .	3415	271	50	16¼	4200 T.	Copenhagen	1899	1901	..	8–4 H.S	2	7 H.S.	..	6 H.S.	6 H.S.	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	..	250
b.	Iver Hvitfeldt *	3208	242	49½	18	5100	Copenhagen	1886 1900	1889	200,000	12	2	..	9½	8	..	2 *10·2-in.* (K.), 4 *4·7-in.*, 12 M.	4	15·6	250	298
c.d.s.,t.	Lindormen .	2043	216	39½	13¾	1560	Copenhagen	1868	1870	93,000	5–3	..	..	..	6	..	2 *9-in.* (A.) M.L.R., 3 *3·4-in.* (K.), 4 M.	..	12·0	120	140
c.b.	Odin . . .	3034	237	50	15½	2260	Copenhagen	1872 1902	1875	147,000	8–4	1½	..	7	8 comp.	..	4 *10-in.* (A.) M.L.R., 4 *3·4-in.* (K.), 7 M.	..	12·4	180	236
c.d.s.,t.	Olfert Fischer .	3415	271	59	18¾	4200	Copenhagen	1903	..	..	8–4 K.S.	..	7 K.S.	..	6 K.S.	..	2 *9·4-in.*, 4 *5·9-in.*, 10 *2·2-in.*, 8 smaller.	3 (sub.)	16·0	..	250
.	Skjold . .	2115	226½	38	13½	2200 T.	Copenhagen	1896	1899	..	9	2	..	7	8	4½	1 *9·4-in.*, 3 *4·7-in.* (K.), 4 *1·8-in.*, 1 M.	4	13·0	280	210
T. S.	Tordenskjold .	2362	221½	43¼	15½	2600	Copenhagen	1880	1883	138,900	..	4–2	..	..	8 comp.	..	1 *14-in.* (K.), 4 *4·7-in.*, 8 M.	4	14·0	170	220

Esbern Snare (torpedo school-ship), 530 tons, 2-in. belt.

* Seriously damaged by fire in her coal-bunkers.

DENMARK.—Cruising Ships, &c.

Class.	NAME.		Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.		Armament.		Speed.	Coal.	Complement.
												Deck.	Gun Position.	Guns.	Torpedo Tubes.			
			tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Fyen	shd.	2555	226½	45½	18	2700	Copenhagen	1882	1884	170,000	1½	..	18 5·9-*in.* (K.), 8 M.	2	13·0	290	407
3rd cl. cr.	Geiser		1260	257½	27½	11¼	3000 T.	Copenhagen	1892	1893	..	1½	..	2 4·7-*in.*, 4 3·4-*in.*, 6 M.	4	17·1 *t*	125	155
"	Heimdal		1260	257½	27½	11¼	3000	Copenhagen	1894	1896	..	1½	..	2 4·7-*in.*, 4 3-*pr.*, 6 M.	4	17·5	125	155
"	Hekla		1260	233	32¾	11¼	3000	Copenhagen	1890	1893	..	1½	..	2 6-*in.*, 4 2·2-*in.*, 6 M.	4	17·0	125	155
cr.	Valkyrien		2854	268	43½	18	5300	Copenhagen	1887 1896	1890	..	2½	..	2 8·2-*in.* (K.), 6 5·9-*in.*, 4 Q.F., 10 M.	5	17·0	450	300

Gunboats.—Five in number (*Lille Belt, Öresund, Store Belt, Grönsund, Guldborgsund*), of 150 to 240 tons, 200 to 400 I.H.P. The *Guldborgsund* is receiving new boilers; boilers of the *Grönsund* and the cruiser *Heimdal* being improved, 1903.

Dagmar (training-ship), corvette, 1200 tons; *Hjaelperen* (mining), 280 tons; *Sleipnir* (ice-breaker), 1260 tons, 3000 I.H.P. Training-brig *Örnen* in hand.
The *Beskytteren*, torpedo transport, 389 tons, 600 I.H.P., B. & W. boilers, 3 1·8-in. Q.F., launched 1900.

FRANCE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Gun Position: Heavy Guns.	Gun Position: Secondary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.g.b.	Achéron	1693	181	40¼	11¾	1700	Cherbourg	1885 1900	1887	100,000	9½–6 comp.	2½	..	..	8 comp.	..	1 10·8-in., 3 3·9-in., 2 1·8-in., 4 M.	..	13·0	100	101
a.c.	Aube (Amiral)	9856	453	66¼	24½	22,155 t B.	St. Nazaire	1902	1904	973,440	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 7·6-in., 8 6·4-in., 4 3·9-in., 26 small Q.F. and M.	4 (2 sub.)	21·9 t	970 1590	615
b.	Baudin	10,884	321½	69¾	26¼	8320	Brest	1883 1899	1885	600,000	14–10	4	..	..	16½	4½	2 16·8-in., 4 6·4-in., 8 5·5-in., 36 small Q.F. and M.	4	15·0	800	630
t.	Bouvet	12,007	401¼	70¼	27¼	14,000 B.	Lorient	1896	1898	1,100,770	15¾–8 H.S.	3½	4 H.S.	..	14½ H.S.	4 H.S.	2 12-in., 2 10·8-in., 8 5·5-in., 8 3·9-in., 19 small Q.F. and M.	4 (2 sub.)	18·2 t	621	621
t.	Bouvines	6691	293¾	58¼	23¼	8400 A'D.	La Seyne	1892	1894	594,640	17¾	4	..	..	14½	..	2 12-in., 8 3·9-in., 4 1·8-in., 10 1·4-in. M.	2	16·05 t	300	323
t.	Brennus	11,190	361	67	26½	14,000 B.	Lorient	1891	1895	991,767	15¾ comp.	4	4¾ comp.	..	17¾ comp.	4¾ comp.	3 13·4-in., 10 6·4-in., 26 small Q.F. and M.	4	17·1 t	800	696
a.c.	Bruix	4755	365¼	46	19¾	9049 B.	Rochefort	1894	1896	409,622	3¾–2¾	2	3¾	..	3¾	3¾	2 7·6-in., 6 5·5-in., 4 2·5-in., 4 1·8-in., 4 1·4-in., M.	4	18·3 t	406	391
a.c.	"C" 16	13,347	515	70½	26¾	36,000	Brest	Pro.	..	..	..	..	..	..	..	..	4 7·6-in., 12 6·4-in. Q.F., 22 1·8-in., 2 1·4 in.	5 (2 sub.)	23·0	2300	728
t.	Caïman	7050	278¼	59	24½	6000	Toulon	1885 1892	1887	..	19½	3	..	..	10 H.S.	..	2 10·8-in., 6 3·9-in., 10 1·8-in., 4 1·4-in., 2 M.	4	14·5 t	400 800	332
t.	Carnot	11,954	382¼	70½	27¼	16,300 t D'A.	Toulon	1894	1896	1,070,088	17¾–9 comp.	2¾	4	..	14½	4	2 12-in., 2 10·8-in., 8 5·5-in., 4 2·5-in., 16 1·8-in., 10 1·4-in.	4 (2 sub.)	17·86 t	705	625
a.c.	Chanzy	4736	348	46	19½	8300 B.	Bordeaux	1894	1896	360,000	3¾–2¾	2	3¾	..	3¾	3¾	2 7·6-in., 6 5·5-in., 4 2·5-in., 6 1·8-in., 6 1·4-in., M.	4	19·0	413	375
t.	Charlemagne	11,108	385½	66½	27½	14,500 B.	Brest	1895	1898	1,096,432	15¾ H.N.	3½	3 H.N.	..	15¾ H.N.	3 H.N.	4 12-in., 10 5·5-in., 8 3·9-in., 16 1·8-in., 10 1·4-in., 8 M.	4 (2 sub.)	18·1 t	680 1100	631
t.	Charles Martel	11,693	392½	71	27½	14,996 t D'A.	Brest	1893	1897	1,092,830	17¾	3½	4	..	15¾	4	2 12-in., 2 10·8-in., 8 5·5-in., 4 2·5-in., 14 1·8-in., 5 1·4-in.	6	18·1 t	677	632
a.c.	Charner	4702	348	46	19¾	8300 B.	Rochefort	1893	1895	353,200	3¾–2¾	2	3¾	..	3¾	3¾	2 7·6-in., 6 6·5-in., 14 small Q.F. and M.	5	18·2 t	413	375
a.g.b.	Cocyte	1688	181¾	40¼	11¾	1700	Cherbourg	1887	1889	100,000	9½–6 comp.	2½	..	..	8 comp.	..	1 10·8-in., 2 3·9-in., 2 1·8-in., 4 M.	..	13·0	100	101
a.c.	Condé	9856	453	63¾	24½	20,500 Nic.	Lorient	1902	1904	863,799	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 7·6-in., 8 6·4-in., 6 3·9-in., 16 1·8-in., 6 1·4-in.	5 (2 sub.)	21·0	970 1590	615
c.b.&b.	Courbet	10,196	312	67	25	8100 B.	Toulon	1881 1899	1884	800,000	15–9	2½	..	12	9½	4½ shield.	4 10·8-in., 3 9·4-in., 1 6·4-in., 10 3·9-in., 14 1·8-in., 17 1·4-in.	5	15·4 t	1000	669
t.	Démocratie	14,635	438¾	79½	27½	18,000 W.T.	Brest	1902	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 12-in., 10 7·6-in., 26 1·8-in., 2 1·4-in.	5 (2 sub.)	18·0	905 1825	793
a.c.	Desaix shd.	7578	426½	58¼	24¼	17,715 t B.	St. Nazaire	1901	..	762,759	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 6·4-in., 4 3·9-in., 10 1·8-in., 4 1·4-in.	2	21·7 t	880 1200	531
c.b.&b.	Dévastation	10,095	312	67	25	8320 B.	Lorient	1879 1901	1882	..	15–9	2½	..	12	9½	4½	4 10·8-in., 2 9·4-in., 14 3·9-in., 24 smaller Q.F., 14 M.	4	15·17 t	950	685
b.	Duperré*	11,032	311	67	26¾	8120	La Seyne	1879 1903	1882	570,000	21–10	2¼	..	..	12	6	3 13·3-in., 4 6·4-in., 1 5·5-in., 14 4-in., 42 small Q.F. and M.	4	14·22 t	850	664
a.c.	DupetitThouars	9367	452¾	63¾	24½	19,600 B.	Toulon	1901	..	831,839	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 7·6-in., 8 6·4-in., 4 3·9-in., 16 1·8-in., 6 1·4-in.	(2 sub.)	21·0	‡ 1020 1600	610
a.c.	Dupleix shd.	7578	426½	58¼	24¼	17,100 B.	Rochefort	1900	1903	652,354	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 6·4-in., 4 3·9-in., 10 1·8-in., 4 1·4-in.	2	21·0	880 1200	531
a.c.	Dupuy de Lôme	5676	374	51½	26¾	14,000 N.S.	Brest	1890	1893	416,000	4	2	4	..	4	4	2 7·6-in., 6 6·4-in., 12 2·5-in. and 1·8-in., 8 M.	4	20·0	900	515
a.c.	Ernest Renan	13,347	515	70½	26¾	36,000	..	Bdg	..	..	..	..	..	..	..	..	4 7·6-in., 12 6·4-in. Q.F., 22 1·8-in., 2 1·4-in.	5 (2 sub.)	23·0	2250	728
a.g.b	Flamme	1124	515	32½	10¼	1500	Cherbourg	1885	1887	68,000	10–7	2	..	..	8	4	1 9·4-in., 1 3·5-in., 4 M.	1	13·0	120	84
b.	Formidable	10,878	321½	69½	26¼	9700†	Lorient	1885 1899	1888	467,520	14–10	3	..	..	16½	4½	2 10·8-in., 4 6·4-in., 8 5·5-in., 36 smaller.	6	16·0	900	640
c.d.s.,t.	Fulminant	5871	248	57¾	21¼	4500	Cherbourg	1877	1879	..	13–10 iron	2	12	12	12	..	2 10·8-in., 4 1·8-in., 6 M.	2	13·8 t	400	248
c.d.s., b.	Furieux**	5925	248	59	21¾	5033 Nic.	Cherbourg	1883 1903	1885	264,640	20–13 comp.	3½	..	..	9 K.S.	..	2 9·4-in., 5 Q.F., 10 M.††	2	14·0	290	248

* Reconstruction of Duperré deferred. Proposed new armament given. To be transformed into a gunnery ship at Toulon to replace the Couronne. † Has received new boilers. ‡ Including liquid fuel.
** Reconstruction deferred. †† Intended new armament.

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
a.g.b.	**Fusée** . shd.	1124	165	32½	10¼	1500	Lorient .	1884	1886	68,000	10–7 *comp.*	2	..	..	4 *comp.*	..	1 *9·4-in.*, 1 *3·5-in.*, 4 M. .	1	13·0	120	84
t.	**Gaulois** . .	11,105	385½	66½	27½	14,500 B.	Brest .	1896	1898	1,093,925	15¾ H.N.	3½–1½	3 H.N.	..	15¾ H.N.	3 H.N	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	6 (2 sub.)	18·0	680/1100	632
a.c.	**Gloire** . .	9856	453	63¾	24½	20,500 Nic.	Lorient .	1900	1904	883,269	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *8·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	5 (2 sub.)	21·0	970/1590	615
a.g.b.	**Grenade** . shd.	1073	165	32½	10¼	1500	Lorient .	1888	1890	68,000	10–7	2	..	..	8	4	1 *9·4-in.*, 1 *3·5-in.*, 4 M. .	1	13·0	120	84
a.c.	**Gueydon** . . (Amiral)	9367	459	63¾	24½	20,200 Nic.	Lorient .	1899	1902	817,994	6–3¾ H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	3¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	1020/1600	610
	Henri IV. .	8807	354½	72	23	11,500 Nic.	Cherbourg.	1899	1903	801,248	11–7 H.S.	3	4¾ H.S.	..	11¾ H.S.	5 H.S.	2 *10·8-in.*, 7 *5·5-in.*, 12 *1·8-in.*, 2 M.	2 (sub.)	17·2 *t*	735/1100	464
t. & b.	**Hoche** . .	10,581	333	65½	27¼	11,300 B.	Lorient .	1886 1900	1889	700,000	18–14 *comp.*	3	3	..	16 *comp.*	..	2 *13·4-in.*, 2 *10·8-in.*, 12 *5·5-in.*, 4 *2·5-in.*, 9 *1·8-in.*, 12 *1·4-in.*, 8 M.	5	16·0	800	660
t.	**Iéna** . . .	11,861	400¾	68¼	27½	16,500 *t* B.	Brest .	1898	1901	1,111,340	13¾-6 H.S.	2½	5–4 H.S.	..	..	4 H.S.	4 *12-in.*, 8 *6·4-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 5 *1·4-in.*, 13 *1·4-in.* M.	4 (2 sub.)	18·2 *t*	820/1100	631
t.	**Indomptable** .	7105	279¾	59	23½	6605 Nic.	Lorient .	1883 1902	1886	..	19½ *comp.*	3	..	..	10 H.S.	..	2 *10·8-in.*, 6 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*, 2 M.	4	14·8 *t*	400/800	332
t.	**Jauréguiberry** .	11,637	364	72¾	27¾	15,800 D'A.	La Seyne .	1893	1896	1,069,536	17¾	2¾	4	..	14½	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 *1·4-in.*, 8 M.	6	18·07 *t*	700	625
a.c.	**Jeanne d'Arc** .	11,092	477¼	63¾	26½	28,000 Guyot	Toulon .	1899	1903	875,847	6–3 H.S.	2·2	3 H.S.	..	6 H.S.	5 H.S.	2 *7·6-in.*, 14 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*, 2 M.	2 (sub.)	21·7 *t*	1400/2000	626
c.d.s.,t.	**Jemmapes** .	6474	284	57¾	22	9250 D'A.	St. Nazaire	1892	1894	525,000	17¾–10	4–2¾	..	..	17¾	..	2 *13·4-in.*, 4 *3·9-in.*, 4 *1·8-in.*, 10 *1·4-in.*, M.	2	16·7 *t*	300	334
a.c.	**Jules Ferry** .	12,351	480½	70¼	27	27,500 Guyot	Cherbourg	1903	..	1,169,940	6–4 H.S.	2	5–3 H.S.	..	5 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	21·0	1320/2100	728
a.c.	**Jules Michelet.**	12,370	480½	70¼	27	27,500 W.T.	Lorient .	Bldg.	..	1,183,800	6¾ H.S.	2½	..	..	..	..	4 *7·6-in.*, 12 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	23·0	1320/2100	728
t.	**Justice** . .	14,635	438¾	79½	27½	18,000 W.T.	La Seyne .	Bldg.	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905/1825	793
a.c.	**Kléber** . shd.	7578	426½	58¼	24¼	18,000 Nic.	Bordeaux .	1902	1903	770,320	4–3 H.S.	2¾	..	..	3½ H.S.	..	8 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.* 4 *1·4-in.*	2	21·2 *t*	880/1200	531
a.c.	**Latouche - Tréville**	4681	348	46	19¼	8300 B.	Havre .	1892	1893	360,000	3¾–2¾	2	3¾	..	3¾	3¾	2 *7·6-in.*, 6 *5·5-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 6 *1·4-in.*, M.	4	18·2 *t*	406	375
a.c.	**Léon Gambetta**	12,351	480½	70¼	27	27,500 Nic.	Brest .	1901	..	1,169,940	6–4 H.S.	2	5–3 H.S.	..	5 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	22·0	1320/2100	728
t.	**Liberté** . .	14,635	434¾	79½	27½	18,000 W.T.	St. Nazaire	Bldg.	..	1,421,708	11 H.S.	..	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905/1825	793
b.	**Magenta** . .	10,680	330	65½	27¼	12,000	Toulon .	1890 1901	1893	760,960	18–12	3	..	..	16	2 screen.	4 *13·4-in.*, 17 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 M.	3	16·25 *t*	800	660
b.	**Marceau** . .	10,558	330	65½	27¼	14,000 Nic.	La Seyne .	1887 1901	1890	769,080	18	3	..	..	16	2 screen.	4 *13·4-in.*, 17 *5·5-in.*, 4 *2·5-in.*, 12 *1·8-in.*, 8 M.	6	16·4 *t*	800	660
a.c.	**Marseillaise** .	9856	453	63¾	24½	20,500 B.	Brest .	1902	1903	881,270	6–4 H.S.	2	5–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 2 *2·5-in.*, 18 *1·8-in.*, 6 *1·4-in.*	4 (2 sub.)	21·0	970/1590	615
t.	**Masséna** . .	11,735	384¾	66	27	13,500 D'A.	St. Nazaire	1895	1898	1,100,400	17¾–9¾	3½	4 H.S.	16	15¾ 15¾ H.S.	4	2 *12-in.*, 2 *10·8-in.*, 8 *5·5-in.*, 8 *3·9-in.*, 12 *1·8-in.*, 12 *1·4-in.*	6 (2 sub.)	17·1 *t*	630	642
a.g.b.	**Mitraille** . shd.	1110	165	32½	10¼	1500	Rochefort	1886	1888	70,000	10–7 *comp.*	2	..	..	4 *comp.*	..	1 *9·4-in.*, 1 *3·5-in.*, 4 M.	..	13·0	120	84
a.c.	**Montcalm** . .	9367	452¾	63¾	24½	19,600 N.S.	La Seyne .	1900	1902	902,809	6 H.S.	2	3¾ H.S.	6 H.S.	6 H.S.	2¾ H.S.	2 *7·6-in.*, 8 *6·4-in.*, 4 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	2 (sub.)	21·0	† 1020/1600	612
b.	**Neptune** * . .	10,810	330	65½	27¼	12,000 B.	Brest .	1887 1903	1892	780,000	18	3	..	..	16	2 screen.	4 *13·4-in.*, 17 *5·5-in.*, 4 *5·5-in.*, 12 *1·8-in.*, 8 M.	5	16·02 *t*	800	660
t.	**Patrie** . . .	14,635	438¾	79½	27½	18,000 Nic.	La Seyne .	1903	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905/1825	793
a.g.b.	**Phlégéton** . .	1767	187	40¼	11¾	1700	Cherbourg	1890	1892	142,000	9–6 *comp.*	2	..	..	8 *comp.*	..	1 *10·8-in.*, 1 *5·5-in.*, 4 *1·8-in.*, 4 M.		12·4 *t*	72	101
a.c.	**Pothuau** . .	5374	370½	50¼	21	10,398 B.	Havre .	1895	1896	384,000	3⅛–2	3⅜	2½	..	9½	5½	2 *7·6-in.*, 10 *5·5-in.*, 16 *1·8-in.*, 8 *1·4-in.*	..	19·2 *t*	538	461
c.b. & b.	**Redoutable** .	9164	318¼	64¾	25½	6071	Lorient .	1876 1896	1879	..	14–9	2½	..	9½	9½	..	4 *10·8-in.*, 4 *9·4-in.*, 6 *3·9-in.*, 14 *1·8-in.*, 12 M.	4	14·66 *t*	1000	700

* Reconstruction deferred.

† Including liquid fuel.

FRANCE.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t	République	14,635	438¾	79½	27½	18,000 N.	Brest	1902	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 18 *6·4-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905/1825	793
b.	Requin	7078	279¾	59	24½	7000 Nic.	Bordeaux	1885 1902	1888	..	19½ comp.	3	..	..	10 H.S.	..	2 *10·8-in.*, 6 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*, 12 M.	4	15·0	400/800	332
t.	Saint Louis	11,090	385½	66½	27½	14,500 B.	Lorient	1896	1900	1,080,997	15¾ H.N.	3½	3 H.N.	..	3–15¾ H.N.	3 H.N.	4 *12-in.*, 10 *5·5-in.*, 8 *3·9-in.*, 16 *1·8-in.*, 10 *1·4-in.*, 8 M.	4 (2 sub.)	18·0	820/1150	631
a.g.b.	Styx	1767	187	40¼	11¾	1700	Cherbourg	1892	1893	142,000	9–6 comp.	2	..	..	8 comp.	..	1 *10·8-in.*, 1 *5·5-in.*, 4 *1·8-in.*, 4 M.	..	13·0	72	101
t.	Suffren	12,527	411¾	70¼	27½	16,500 Nic.	Brest	1899	1903	1,195,564	12–8 H.S.	2¾	5–3 H.S.	..	12 H.S.	6–5 H.S.	4 *12-in.*, 10 *6·4-in*, 8 *3·9-in.*, 20 *1·8-in.*, 2 *1·4-in.*	4 (2 sub.)	18·0	1100/1820	615
a.c.	Sully	9856	453	63¾	24½	20,000 B.	La Seyne	1901	1903	954,536	6–4 H.S.	2	5½–2 H.S.	..	7½ H.S.	6½–5 H.S.	2 *7·6-in.*, 8 *6·4-in.*, 6 *3·9-in.*, 16 *1·8-in.*, 6 *1·4-in.*	5 (2 sub.)	21·0	970/1590	..
c.d.s., t.	Tempête	4793	248	57¾	16¾	2193	Brest	1876	1879	..	13–10 iron	2	12 iron	12 iron	12 iron	..	2 *10·8-in.*, 4 *1·8-in.*, 6 M.	2	11·7 *t*	200	197
b.	Terrible	7206	279¾	59	24½	6230	Brest	1881 1902	1884	..	19½ comp.	3	..	..	10 H.S.	..	2 *13·4-in.*, 6 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.*	4	14·5 *t*	400/800	332
c.d.s., t.	Tonnerre	5765	248	57¾	21¼	4165	Toulon	1175	1877	..	13–10 iron	2	12 iron	12 iron	12 iron	..	2 *10·8-in.*, 4 *1·8-in.*, 6 M.	2	14·01 *t*	400	249
t.	Tréhouart	6671	293¼	58¼	23¼	8500 B.	Lorient	1893	1896	593,100	17¾	4	..	..	14½	..	2 *12-in.*, 8 *3·9-in*, 4 *1·8-in.*, 4 *1·4-in.*, 8 M.	2	15·76 *t*	300	337
c.d.s., t.	Valmy	6477	293¾	57¼	23¼	8954	St. Nazaire	1892	1895	578,957	17¾	4	..	..	17¾	..	2 *13·4-in.*, 4 *3·9-in.*, 4 *1·8-in.*, 10 M.	2	16·7 *t*	300	297
a.c.	Vauban	6110	267¾	57	24	4560	Cherbourg	1882	1885	..	9 comp.	2	..	..	8 comp.	..	4 *9·4-in.*, 1 *7·6-in.*, 6 *5·5-in.*, 12 M.	2	14·32 *t*	550	440
c.d.s., t.	Vengeur	4635	248	57¾	16	2030	Cherbourg	1878	1880	..	13–10 iron	2	12 iron	12 iron	12 iron	..	2 *12·5-in.*, 4 *1·8-in.*, 6 M.	2	10·83 *t*	200	107
.	Vérité	14,635	438¾	79½	27½	18,000 W.T	Bordeaux	..	..	1,421,708	11–7 H.S.	2¾	8 H.S.	..	12 H.S.	6 H.S.	4 *12-in.*, 10 *7·6-in.*, 26 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	18·0	905/1825	822
a.c.	Victor Hugo	12,351	480½	70¼	27	27,500 W.T.	Lorient	1904	..	1,169,940	6–4 H.S.	2	5–3 H.S.	..	5 H.S.	5 H.S.	4 *7·6-in.*, 16 *6·4-in.*, 22 *1·8-in.*, 2 *1·4-in.*	5 (2 sub.)	22·0	1320/2100	728

FRANCE.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Alger	4313	346	45¼	19½	8254 B.	Cherbourg	1889	1893	280,000	3½	..	4 *6·4-in.*, 6 *5·5-in.*, 10 smaller, 10 M.	4	19·61 *t*	860	325
g. v.	Aspic	468	145¼	23¾	10¼	453	Rochefort	1880	1881	..	..	..	2 *5·5-in.*, 2 *3·9-in.*	..	10·3 *t*	50	80
to. g. b.	Bombe	413	196¾	21½	5¾	2000 D'A.	Havre	1885	1886	..	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
3rd cl. *cr.*	Bugeaud	3809	308½	43½	20½	9000 B.	Cherbourg	1893	1896	308,650	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 11 *1·4-in.*	6	18·9 *t*	587	358
g. v.	Capricorne	475	148¼	23¾	10¼	443	Havre	1882	1883	..	..	..	2 *5·5-in.*, 2 *3·9-in.*	..	11·18 *t*	70	80
to. g. b.	Casabianca	974	262½	26¾	11½	5200 D'A.	Bordeaux	1895	1896	98,985	½	..	1 *3·9-in.*, 3 *2·5-in.*, 5 *1·8-in.*, 4 *1·4-in.*	..	22·0	116	143
3rd cl. *cr.*	Cassard	3890	325½	45	20½	10,143 D'A.	Cherbourg	1896	1898	318,712	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	19·8 *t*	630	385
to. g. b.	Cassini	966	262½	27¼	11½	5500 D'A.	Bordeaux	1894	1894	98,500	½	..	1 *3·9-in.*, 3 *2·5-in.*, 4 *1·4-in.*	2	21·2 *t*	110	118
3rd cl. *cr.*	Catinat . shd.	4048	331¾	44½	21	9000 B.	Havre	1896	1897	324,992	3	2 shield	4 *6·4-in.*, 10 *3·9-in.*, 10 *1·8-in.*, 4 *1·4-in.* M.	2	19·0	563	384
2nd cl. *cr.*	Cécille	5839	378¾	49¼	19¾	10,200	La Seyne	1888	1890	299,666	4	..	8 *6·4-in.*, 10 *5·5-in.*, 6 *1·8-in.*, 14 M.	4	19·0	940	486
3rd cl. *cr.*	Chasseloup-Laubat	3824	308½	43½	20¾	9000 D'A.	Cherbourg	1893	1894	256,320	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 12 *1·4-in.*, M.	6	19·25 *t*	587	358
2nd cl. *cr.*	Châteaurenault shd.	7898	442¾	55¾	24½	24,300 *t* N.S.	La Seyne	1898	1902	606,656	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	..	24·19 *t*	1400/2100	625
3rd cl. *cr.*	Coëtlogon	1901	312	30¼	14	5800	St. Nazaire	1889	1894	134,000	1½	..	4 *5·5-in.*, 3 other Q.F., 4 M.	5	19·3 *t*	200	190
g. v.	Comète	487	151½	24¾	10½	631	Cherbourg	1884	1885	..	..	..	2 *5·5-in.*, 2 *3·9-in.*, 2 M.	..	12·2 *t*	60	84
to. cr.	Condor	1229	216½	29¼	15¼	3800	Rochefort	1885 1896	1886	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	5	17·7 *t*	160	134

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. *cr.*	Cosmao	1923	312	30½	14	6000	Bordeaux	1888	1890	133,000	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	5	20·5 *t*	200	190
to. g. b.	Couleuvrine	369	196¾	21½	6	2047	Havre	1885	1886	33,778	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
to. g. b.	Dague	402	196¾	21½	6	2000	Havre	1885	1886	36,119	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
3rd cl. *cr.*	D'Assas	3962	325½	45	20½	9500 D'A.	St. Nazaire	1896	1898	292,682	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 11 *1·4-in.*	2	19·25 *t*	630	393
3rd cl. *cr.*	Davout	3031	295¼	40	17½	9000 ic	Toulon	1890	1902	221,827	3	..	6 *6·4-in.*, 4 *3·9-in.*, 4 *2·5-in.*, 4 *1·8-in.*, 6 M.	4	20·07 *t*	600	336
g. v.	Décidée	635	184¾	26¼	12¼	1000 Nic.	Lorient	1899	1900	54,100	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	99	99
1st cl. *cr.*	D'Entrecasteaux shd.	7995	383½	58½	25¾	13,500	La Seyne	1896	1898	667,740	4	10–3 H.S.	2 *9·4-in.*, 12 *5·5-in.*, 12 *1·8-in.*	6	19·2 *t*	650	521
3rd cl. *cr.*	Descartes shd.	3970	326	42¼	21¾	9000 B.	St. Nazaire	1894	1896	334,725	1½	..	4 *6·4-in.*, 10 *3·7-in.*, 8 *1·8-in.*, 4 *1·4-in.*	2	21·0 *t*	552	386
cr.	D'Estaing	2435	262½	37½	18¾	3700	Brest	1879	1881	84,718	..	..	15 *5·5-in.*, 8 M.	..	15·31 *t*	300	264
3rd cl. *cr.*	D'Estrées shd.	2421	311¾	39¼	17¾	8500 Nor.	Rochefort	1897	1900	208,200	1½	..	2 *5·5-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*	..	20·5 *t*	345/480	234
to. g. b.	D'Iberville	952	262½	27	11¼	5060 D'A.	St. Nazaire	1893	1894	99,120	½	..	1 *3·9-in.*, 1 *2·5-in.*, 4 *1·4-in.*	6	21·4 *t*	117	118
to. g. b.	Dragonne	403	196¾	21½	6	2000	Havre	1885	1886	36,074	..	..	4 *5·5-in.*, 3 M.	2	18·0	100	63
3rd cl. *cr.*	Du Chayla shd.	3890	325½	45	20½	10,009 D'A.	Cherbourg	1895	1897	315,835	3	2 shield	6 *6·4-in.*, 4 *3·9-in.*, 10 *1·8-in.*, 3 *1·4-in.*, 2 M.	2	20·2 *t*	624	385
to. g. b.	Dunois	889	256	27¾	12¾	7000 N.S.	Cherbourg	1897	1898	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.*	..	23·0	137	128
to. cr.	Epervier	1268	216½	29¼	15½	3200	Rochefort	1885	1887	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	5	17·6 *t*	160	134
to. cr.	Faucon	1311	216½	29¼	15½	3200	Toulon	1887	1888	80,000	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	5	18·0	150	134
to. g. b.	Flèche	418	196¾	21½	6	200	Havre	1885	1886	37,517	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
3rd cl. *cr.*	Fleurus	1289	229¾	29¼	15¼	4000 Nic.	Cherbourg	1893	1898	128,530	..	..	5 *3·9-in.*, 6 *1·8-in.*, 4 M.	..	17·6 *t*	118	179
3rd cl. *cr.*	Forbin	1935	312	30½	16	5700	Rochefort	1888	1900	123,739	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	5	20·6	200	190
T.D.S.	Foudre	5984	370½	52½	23½	11,900 *t* D'A.	Bordeaux	1895	1897	407,712	3½	..	10 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	19·9 *t*	840	410
3rd cl. *cr.*	Friant	3882	308½	43½	20¾	9000 Nic.	Brest	1893	1894	308,750	3	..	6 *6·4-in.*, 4 *3·9-in.*, 8 *1·8-in.*, 6 *1·4-in.*	2	18·19	587	358
g. v.	Fulton	899	199½	28½	12¾	850	Lorient	1887	1888	37,000	..	..	2 *5·5-in.*, 1 *3·9-in.*, 5 M.	..	13·0	160	116
3rd cl. *cr.*	Galilée	2318	330¼	34½	17¾	6600 B.	Rochefort	1896	1897	208,152	1½	2 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 8 *1·4-in.*	..	20·0	226	248
2nd cl. *cr.*	Guichen shd.	8151	436½	54¾	24½	24,000 D'A.	St. Nazaire	1897	1902	611,945	2½	2 shield	2 *6·4-in.*, 6 *5·5-in.*, 10 *1·8-in.*	..	23·0	1460	625
3rd cl. *cr.*	Infernet shd.	2435	311¾	39¼	15½	8500 Nor.	Bordeaux	1899	1900	193,000	..	..	2 *5·5-in.*, 4 *3·9-in.*, 8 *1·8-in.*	..	20·5	345/480	234
3rd cl. *cr.*	Isly	4406	346	43½	19½	8100	Brest	1891	1892	252,760	3	..	4 *6·4-in.*, 6 *5·5-in.*, 14 *2·5-in.* and *1·8-in.*, 8 M.	5	18·3	880	332
2nd cl. *cr.*	Jurien de la Gravière shd.	5595	440	48¾	22	17,000 Guyot	Lorient	1899	1901	475,979	3	..	8 *6·4-in.*, 12 *1·8-in.*	2	22·9 *t*	600/900	511
3rd cl. *cr.*	Jean Bart	4044	346	43½	19½	10,000 Nic.	Rochefort	1889	1891	283,240	4	..	4 *6·4-in.*, 6 *5·5-in.*, 14 *2·5-in.* and *1·8-in.*, 8 M.	5	19·0	940	332

FRANCE.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g. v.	**Kersaint** . shd.	1223	226	34½	15	2200	Rochefort	1897	1898	107,933	..	..	1 *5·5-in.*, 5 *3·9-in.*, 7 *1·4-in.*	..	15·0	199	110
to. g. b.	**La Hire**	889	256	27¾	12¾	7000 N.S.	Cherbourg	1898	1899	123,383	..	..	6 *2·5-in.*, 6 *1·8-in.*	..	23·0	137	128
3rd cl. *cr.*	**Lalande**	1968	311½	31¼	14	6000	Bordeaux	1888	1900	133,800	1½	..	6 *5·5-in.*, 8 other Q.F., 4 M.	5	22·0	200	190
to. g. b.	**Lance**	395	196¾	21½	5¾	2000 Du T.	Havre	1886	1887	39,964	..	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
3rd cl. *cr.*	**Lavoisier**	2285	330¼	34½	17¾	6400 B.	Rochefort	1897	1899	202,024	1½	2 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 2 *1·4-in.*, 4 M.	2	20·0	226	248
to. g. b.	**Léger**	509	197	23	10½	2360 B.	Lorient	1891	1892	52,000	..	..	1 *3·9-in.*, 3 *2·5-in.*, 4 *1·4-in.*	3	18·8 *t*	130	69
to. g. b.	**Lévrier**	497	197	23	10½	2240 B.	Lorient	1891	1892	52,000	..	..	1 *3·9-in.*, 3 *2·5-in.*, 4 *1·4-in.*	3	18·5 *t*	130	69
3rd cl. *cr.*	**Linois**	2308	321½	34½	17½	6600	La Seyne	1894	1895	163,014	1½	3·9 shield	4 *5·5-in.*, 2 *3·9-in.*, 8 *1·8-in.*, 4 *1·4-in.*, 4 M.	4	20·5 *t*	200	248
g. v.	**Lion**	495	151½	24¾	10½	576	Havre	1884	1885	23,146	..	..	2 *5·5-in.*, 4 M.	..	11·8 *t*	70	84
3rd cl. *cr.*	**Milan**	1705	303¼	32¾	14½	3986 B.	St. Nazaire	1886	1888	89,058	..	..	5 *3·9-in.*, 8 M.	2	18·1 *t*	400	186
3rd cl. *cr.*	**Pascal**	3951	326	42¼	21½	9000 *t* B.	Toulon	1895	1897	322,321	1½	..	4 *6·4-in.*, 10 *3·9-in.*, 8 *1·8-in.*, 4 *1·4-in.*, M.	2	20·0 *t*	650	378
3rd cl. *cr.*	**Protet** . shd.	4001	331¾	44¾	21	9300	Bordeaux	1898	1900	324,992	2½	2 shield	4 *6·4-in.*, 10 *3·9-in.*, 10 *1·8-in.*, 2 *1·4-in.*	2	20·2 *t*	563	384
to. g. b.	**Sainte Barbe**	430	196¾	21½	6	2000	Rouen	1885	1886	43,233	1½	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
to. g. b.	**Salve**	406	196¾	21½	6	2000	Rouen	1886	1887	42,538	1½	..	4 *1·8-in.*, 3 M.	2	18·0	100	63
g. v.	**Scorpion**	497	151½	24¾	10½	511	Havre	1883	1884	23,459	..	..	2 *5·5-in.*, 3 M.	..	11·0	70	84
2nd cl. *cr.*	**Sfax**	4561	288¾	49¼	24¾	6522	Brest	1884 1898	1886	200,000	1½	..	6 *6·4-in.*, 10 *5·5-in.*, 6 *1·8-in.*, 6 *1·4-in.*, 4 M.*	2	16·84 *t*	715	473
3rd cl. *cr.*	**Suchet**	3362	318¼	43½	17½	9000	Toulon	1893	1895	226,360	3	..	4 *6·4-in.*, 4 *3·9-in.*, 4 *1·8-in.*, 8 *1·4-in.*, 6 M.	7	20·4 *t*	480	246
3rd cl. *cr.*	**Surcouf**	2012	312	30½	14	6000	Cherbourg	1888	1900	131,200	1½	..	4 *5·5-in.*, 8 other Q.F., 4 M.	5	20·5 *t*	200	190
g. v.	**Surprise**	617	184¾	24½	12¼	853 *t*	Havre	1895	1896	50,954	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·4 *t*	73	99
2nd cl. *cr.*	**Tage** . shd.	7469	390	53¾	22¾	12,410	St. Nazaire	1886	1888	93,857	..	..	8 *6·4-in.*, 10 *5·5-in.*, 2 *2·5-in.*, 6 smaller, 14 M.	7	19·0	1000	400
3rd cl. *cr.*	**Troude**	1994	311½	31¼	14	6000	Bordeaux	1888	1900	33,383	1½	..	4 *5·5-in.*, 8 smaller, 4 M.	5	20·9 *t*	200	190
to. g. b.	**Vautour**	1266	216½	29¼	15½	3391	Toulon	1886	1888	87,732	1½	..	5 *3·9-in.*, 1 *2·5-in.*, 6 M.	5	17·3 *t*	150	134
g. v.	**Vipère**	475	145¼	23¾	10½	441	Rochefort	1881	1882	26,835	..	..	2 *5·5-in.*, 2 *3·9-in.*	..	10·3 *t*	60	80
to. g. b.	**Wattignies**	1272	230	29¼	15	4189	Rochefort	1891	1892	111,000	..	..	5 *3·9-in.*, 6 *1·8-in.*, 7 *1·4-in.*, M.	4	18·61 *t*	160	180
g. v.	**Zélée**	554	185½	26	10½	1000 Nic.	Rochefort	1899	1900	..	..	..	2 *3·9-in.*, 4 *2·5-in.*, 4 *1·4-in.*	..	13·0	80	75

* New armament.

Shallow-draught gunboats Argus and Vigilante, launched at Chiswick (Thornycroft) 1900:—displacement, 122 tons; length, 145 ft.; beam, 24 ft.; draught, 2 ft.; 2 screws; 550 I.H.P.; 13 knots; 2 3·5-in., 4 1·4-in. Q.F. guns; complement, 30; coal capacity, 80. Transport despatch vessel Vaucluse, launched 1901.

Merchant Cruisers (Auxiliary to French Navy).

To what Company belonging.	Name.	Register Tonnage.	Length.	Beam.	Depth.	H.P. (nominal.)	Speed.	When built.
		Tons.	Feet.	Feet.	Feet.		Knots.	
Compagnie Générale Transatlantique	La Lorraine	11,869	563·1	60·0	35·9	2108	20	1900
	La Savoie	11,200	563·1	60·0	35·9	2108	20	1900
	L'Aquitaine	8810	500·0	57·3	34·0	1825	19	1890
	La Touraine	9047	520·2	56·0	34·6	1616	19	1890
	Duc de Bragance	2096	334·6	34·2	16·8	426	17½	1889
	Eugène Pereire	2078	334·6	35·1	23·9	437	17½	1888
	Général Chanzy	2299	341·2	35·7	15·5	478	17½	1891
	La Bretagne	7112	495·4	51·8	34·5	1149	17½	1886
	La Champagne	7087	493·4	51·8	34·5	1149	17½	1885
	La Gascogne	7395	495·4	52·2	34·8	1308	17½	1886
	Maréchal Bugeaud	2206	342·5	34·1	23·0	482	17½	1890
	Ville d'Alger	2211	342·7	36·1	23·0	208	17½	1890
	La Navarre	6648	471·0	50·5	36·4	983	17	1892
	La Normandie	6283	459·3	49·2	34·1	1147	16	1882
	Ville de Tunis	1966	317·3	34·6	16·8	444	15½	1884
	Moïse	1873	310·0	33·5	16·7	443	15	1880
	St. Augustin	1854	314·0	33·8	16·5	443	15	1880
	Versailles	4336	373·7	45·3	27·0	780	..	1882
	Ville de Madrid	1874	308·7	33·5	16·7	370	15	1880
	Ville de Naples	1879	311·6	34·1	16·7	506	15	1881
Messageries Maritimes	Armand Béhic	6635	486·6	50·1	36·8	821	17½	1892
	Australien	6570	482·3	49·2	34·1	818	17½	1889
	Polynésien	6569	482·3	49·2	34·1	818	17½	1890
	Ville de la Ciotat	6631	485·8	49·9	36·8	819	17½	1892
	Annam	6344	446·2	50·9	36·1	832	17½	1898
	Atlantique	6708	468·9	50·6	32·8	832	17½	1899
	Tonkin	6364	446·2	50·9	36·1	832	17½	1898
	Ernest Simons	4562	442·9	47·1	36·7	727	..	1893
	Indus	6357	446·2	50·8	36·1	417	..	1897
	Brésil	5876	463·9	46·4	32·5	743	16½	1889
	Chili	6375	462·6	47·6	36·7	719	..	1894
	Cordillère	6379	462·6	47·6	36·1	721	..	1895
	La Plata	5807	462·6	45·9	32·5	520	16½	1889

NOTE.—The armament for the larger ships is 7 5·5-in. and smaller quick-firers.

GERMANY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c. d. s.	**Aegir**	4048	267	49¼	17¾	4800 T.	Kiel (Danzig)	1895 1903	1897	233,500	9½ H.S.	2	..	..	8¾ H.S.	..	3 9·4-in., 10 3·4-in., 6 M.	3 (1 sub.)	14·8 t	225 †	276
b.	**Baden**	7283	321½	60	15½	6200 Dürr.	Kiel	1880 1897	1884	444,886	16	2¾	10	..	10	..	6 10·2-in., 8 3·4-in., 8 1·4-in., 1 l., 6 M.	5 (2 sub.)	14·0	700	376
a. g. b.	**Basilisk**	1901	154¼	36	10¼	759	Bremen	1878	1879	58,042	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	9·0	40	76
b.	**Bayern**	7283	321½	60	19½	6326 Dürr.	Kiel	1878 1896	1882	406,660	16	3	10	..	10	..	6 10·2-in., 8 3·4-in., 8 1·4-in., 1 l., 6 M.	5 (2 sub.)	14·0	700	376
c. d. s.	**Beowulf**	4048	267	49¼	17¾	4800 T.S.	Bremen	1890 1902	1893	175,000	9½	1¼	..	..	8	..	3 9·4-in., 10 3·4-in., 7 M.	4	15·0	580 †	297
b.	**Brandenburg**	9874	354¼	65	24½	9640	Stettin (Vulcan)	1891	1893	606,500‖	15¾ comp.	2½	..	..	11¾ comp.	1½	6 11-in., 6 4·1-in., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	6	16·5 t	680 800	552
t.	**Braunschweig**	12,997	398½	73½	24½	16,000 T. S. & C.	Germania	1902	..	1,157,500	9–4 K. S.	3	6 K.S.	6 K.S.	10–6 K.S.	5½ K.S.	4 11-in., 14 6·7-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (sub.)	18·0	700 1600§	660
a. g. b.	**Biene**	1091	154¼	36	10¼	759	Bremen	1876	1877	62,853											
a. g. b.	**Camäleon**	1091	154¼	36	10¼	759	Bremen	1878	1880	57,564	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
,,	**Crocodil**	1091	154¼	36	10¼	759	Bremen	1879	1880	57,237											
a. c.	**C.‡**	9348	413¼	65½	25¼	17,000 Dürr.	Hamburg	Pro.	..	875,000	4–3 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	6 (3 sub.)	21·0	950 1500†	550
b.	**Deutschland**	7555	280	62¼	24¼	5360	Poplar	1874 1895	1877	412,022	10	2	..	..	10	..	8 10·2-in., 7 5·9-in., 9 3·4-in., 12 M., 2 l.	5	14·5 t	710	668
a. c.	**Deutschland** (Ersatz)	9348	413¼	65½	25¼	17,000 Dürr.	Hamburg	Bldg.	..	875,000	4–3 K.S.	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	6 (3 sub.)	21·0	950 1500†	550
t.	**Elsass**	12,997	398½	73¾	24½	16,000 W.T.& C.	Danzig (Schichau)	1903	..	1,157,500	9–4 K.S.	3	6 K.S.	..	10–6 K.S.	5½ K.S.	4 11-in., 14 6·7-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (5 sub.)	18·0	800 1600§	660
a. c.	**Fürst Bismarck**	10,482	393½	66½	26	14,000 Dürr.	Kiel	1897	1900	..	7¾ K. S.	3	..	..	7¾ K. S.	4 K.S.	4 9·4-in., 12 5·9-in., 10 3·4-in., 10 1·4-in., 8 M.	6 (5 sub.)	19·0	1000†	565
c. d. s.	**Frithjof**	4048	240	49¼	17¾	4800 T. S.	Bremen	1891	1892	175,000	9¼ H. S.	1¼	..	..	7¾ H. S.	..	3 9·4-in., 8 3·4-in., 6 M.	4	14·8	225	276

† Also liquid fuel. ‡ Estimates, 1904. § And 200 tons "tar oil." ‖ Exclusive of armament.

GERMANY.—Armoured Ships—*continued.*

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Gun Position: Heavy Guns.	Gun Position: Secondary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
c. d. s.	Hagen	4048	267	49¼	17¾	5250 T.	Kiel	1893 1900	1895	..	7 K.S.	1½	..	..	7¾ H.S.	..	3 9·4 in., 10 3·4-in., 7 M.	4	15·0	580§	297
c. d. s.	Heimdall	4048	267	49¼	17¾	4393 T.S.	Wilhelmshaven	1892 1902	1893	233,500											
t.	Hessen	12,997	398½	73¾	24½	16,000 W.T.&C	Kiel (Germania)	1903	..	1,157,500	9–4 K.S.	3	6 K.S.	..	10–6 K.S.	5½ K.S.	4 11-in., 14 6·7-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (5 sub.)	18·0	800 / 1600§	660
c. d. s.	Hildebrand	4048	267	49¼	17¾	4413 T.S	Kiel	1892	1893	218,000	7 K.S.	1½	..	..	7¾ H.S.	..	3 9·4-in., 10 3·4-in., 7 M.	4	15·0	580§	297
a. g. b.	Hummel	1091	143	36	10½	759	Bremen	1881	1881	56,741	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
b.	Kaiser	7555	292	62¼	24½	5700	Poplar	1874	1876	411,301	10	2	..	..	10	..	8 10·2-in., 1 5·9-in., 6 4-in., 9 3·4-in., 2 M., 2 l.	5	14·6 t	710	668
t.	Kaiser Barbarossa					13,000 C.&T.	Danzig	1900	1901												
t.	Kaiser Friedrich III.					13,000 C.&T.	Wilhelmshaven	1896	1898												
t.	Kaiser Wilhelm II.†	10,974	377½	66¾	25½	13,000 C.T.&S.	Wilhelmshaven	1897	1900	962,500	11¾ H.N.S.	3	..	..	9¾ H.N.S.	6 H.N.S.	4 9·4-in., 18 5·9-in., 12 3·3-in., 12 1·4-in., 8 M.	6 (5sub.)	18·0	650 / 1000§	700
t.	Kaiser Wilhelm der Grosse					13,000 C.&T.S.	Germania	1899	1901												
t.	Kaiser Karl der Grosse					13,000 C.&T.S.	Hamburg (Blohm & Voss)	1899	1901												
b.	König Wilhelm	9603	355	60	26½	8350	Blackwall	1868	1869 1896	505,141	12–6	1½	..	..	6	..	20 5·9-in., 18 3·4-in., 8 M., 4 l.	5	14·7 t	700	759
b.	Kurfürst Friedrich Wilhelm.	9874	354¼	65	24½	9959	Wilhelmshaven	1891	1893	653,000‡	15¾ comp.	2½	..	..	11¾ comp.	1½	6 11-in., 6 4·1-in., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	6	16·0	680 / 800	550
t.	Lothringen (ex M.)	9874					Schichau (Danzig)	Bldg	..												
	N.	12,997	398½	73¾	24½	16,000 W.T.&C	Germania	..	..	1,157,500	9–4 K.S.	3	6 K.S.	..	10–6 K.S.	5½ K.S.	4 11-in., 14 6·7-in., 12 3·4-in., 12 1·4-in., 8 M.	6 (5 sub.)	18·0	800 / 1600§	600
	O.*						..	Pro.	..												
	P.*																				
t.	Mecklenburg (F)	11,643	393¾	68¼	24¾	14,000 C.T.&S.	Stettin (Vulcan)	1901	1903	1,061,250	9–4 K.S.	3	6 K.S.	..	10 K.S.	6 K.S.	4 9·4-in., 18 5·9-in., 12 3·3-in., 12 1·4-in., 8 M.	6 (5sub.)	18·1 t	700 / 1450§	715
a. g. b.	Mücke	1091	154¼	36	10¼	759	Bremen	1877	1878	60,960	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
a. g. b.	Natter	1091	154	36	10½	759	Bremen	1880	1881	52,822											
c. d. s. b.	Odin	4048	267	49¼	17¾	4800 T.S.	Danzig	1894	1896	..	9½ H.S.	2	..	..	8¾ H.S.	..	3 9·4-in., 10 3·4-in., 6 M.	3 (1sub.)	15·0	225§	266
b.	Oldenburg	5118	246	59	19½	3900	Stettin	1884	1887	235,342	12 comp.	1	..	..	8 comp.	..	8 9·4-in., 2 3·4-in., 6 M.	4	13·5 t	475	356
t.	Preussen	12,997	389½	73¾	24½	16,009 W.T.&C.	Stettin	1903	..	1,157,500	9–4 K.S.	3	6 K.S.	..	10–6 K.S.	5½ K.S.	4 11-in., 14 16·7-in., 12 3·4-in., 12 1·4-in. & 8 M.	6 (5sub.)	18·0	800 / 1600§	660
a. c.	Prinz Adalbert	8903	396	64¼	25¼	16,000 Dürr.	Kiel	1901	1903	885,000	3 K.S.	1½	3 K.S.	3 K.S.	6 K.S.	4 K S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	4 (3sub.)	21·0	950 / 1500§	504
a. c.	Prinz Friedrich Karl	8903	393½	65½	24¼	17,000 Dürr.	Hamburg	1902	1903	875,000	4 K.S	2	6 K.S.	4 K.S.	6 K.S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	6 (3sub.)	21·0	950 / 1500§	504
a. c.	Prinz Heinrich	8759	396	64¼	25¼	15,000 Durr.	Kiel	1900	1902	730,000	4 K.S.	2½	4 K.S.	..	6 K.S.	4 K.S.	2 9·4-in., 10 5·9-in., 10 3·4-in., 10 1·4-in., 4 M.	4 (3sub.)	20·0	950	528
a. c.	Roon	9348	413½	65½	25¼	17,000 Dürr.	Kiel	1903	..	875,000	4–3 K.S.	2¾	6 K S.	4 K.S.	6 K S.	4 K.S.	4 8·2-in., 10 5·9-in., 12 3·4-in., 10 1·4-in., 4 M.	4 (3sub.)	21·0	950 / 1500§	550
b.	Sachsen	7283	321½	59	21	6000 Dürr.	Stettin	1877	1878 1896	422,178	15¾	3	10	..	15¾	..	6 10·2-in., 8 3·4-in., 8 1·4-in., 1 l., 6 M.	5 (2sub.)	14·0	700	376
t.	Schwaben (G)	11,643	393¾	68¼	24¾	14,000 C.&T.S.	Wilhelmshaven	1901	1903	1,061,250	9–4 K.S.	3	6 K.S.	..	10–6 K.S.	6 K S.	4 9·4-in., 18 5·9-in., 12 3·3-in., 12 1·4-in., 8 M.	6 (5sub.)	18·0	700 / 1450§	715
c. d. s.	Siegfried	4048	267	49¼	17¾	4800 T. S.	Germania	1889	1890	175,000	9½	1½	..	..	7¾	..	3 9·4-in., 6 3·4-in., 6 M.	4	14·8 t	225§	276
a. g. b.	Salamander	1091	154½	36	10¼	759	Bremen	1880	1881	56,914	8	2	..	..	8	..	1 12-in., 2 3·3-in., 2 M.	2	10·0	40	76
"	Skorpion	1091	154¼	36	10½	759	Bremen	1877	1877	60,796											
"	Viper	1091	154¼	36	10¼	759	Bremen	1876	1877	61,463											
"	Wespe	1091	154¼	36	10¼	759	Bremen	1876	1878	53,771											
b.	Weissenburg	9874	354¼	65	24¾	9000	Stettin (Vulcan)	1891	1893	659,475§	15¾	2½	..	..	11¾	1½	6 11-in., 6 4·1-in., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	6	16·0	680 / 800	552
t.	Wettin	11643	393¾	68¼	24¾	14,000 C.&T.S.	Schichau	1901	1902	1,071,250	9–4 K.S.	3	6 K.S.	..	10 K.S.	6 K S.	4 9·4-in., 18 5·9-in., 12 3·3-in., 12 1·4-in., 8 M.	6 (5sub.)	18·0	700 / 1450§	715
t.	Wittelsbach	11640					Wilhelmshaven	1900	1902	1,071,250											
b.	Wörth	9874	354¼	65	24½	10,224 (t)	Kiel	1892	1894	595,250§	15¾	2½	..	..	11¾	1½	6 11-in., 6 4·1-in., 8 3·4-in., 12 1·4-in., 8 M., 2 l.	6	17·2	680 / 800	552
b.	Württemberg	7283	321½	60	19½	6000 T. S.	Stettin	1878 1898	1881	402,512	15¾	3	10	..	10	..	6 10·2-in., 8 3·4-in., 8 1·4-in., 1 l., 6 M.	5 (2sub.)	14·0	700	376
t.	Zähringen	11,643	393¾	68¼	24¾	15,000 C.&T.S.	Germania	1901	1902	1,071,250	9–4 K.S.	3	6 K.S.	..	10 K.S.	6 K.S.	4 9·4-in., 18 5·9-in., 12 3·3-in., 12 1·4-in., 8 M.	6 (5sub.)	19·0	650 / 1000§	715

The Arminius, Friedrich Carl, and Kronprinz are now used for harbour service.

* Estimates, 1904.

† Kaiser Wilhelm II. specially fitted as fleet flagship to receive the Emperor, with a staff of 64.

‡ Exclusive of armament.

§ Also liquid fuel.

GERMANY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
3rd cl. cr.	Alexandrine	2335	236½	42½	18½	2400	Kiel	1885	1886	102,877	..	..	10 5·9-in., 4 4·1-in., 10 M., 1 l.	1	14·0	300	267
„ „	Alexandrine (Ersatz) *	2952	341	43¼	16½	10,000 W.T.	Stettin (Vulcan)	Pro.	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	800	..
„ „	Amazone . shd.	2600	328	38½	16	8000 T.S.	Kiel (Germania)	1900	1901	247,000	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	21·5 t	560	249
„ „	Arcona . shd.	2672	328	38½	16	8000 T.S.	Bremen (Weser)	1902	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	21·0	700	249
„ „	Ariadne . shd.	2600	328	38½	16	8000 T.S.	„ „	1900	1901	247,000	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	560	249
„ „	Berlin. . shd.	2952	341	43¼	16½	10,000 W.T.	Danzig	1903	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	800	..
„ „	Blitz	1360	246	32¾	13½	2839	Kiel	1882	1883	66,935	..	..	6 3·4-in., 4 M.	1	16·0	180	135
„ „	Bremen	2952	341	43¼	16½	10,000 W.T.	Bremen (Weser)	1903	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	800	..
g. b.	Bremse	843	203½	27¾	10½	1500	Bremen	1884	1884	49,308	2½	..	1 8·2-in.	..	15·0	65	73
3rd cl. cr.	Bussard	1555	256	30¼	18¼	2900	Danzig	1890	1890	..	3	..	8 4·1-in., 7 M.	2	16·5 t	300	165
to. g. b.	Comet	931	262½	31¼	13¾	5000	Stettin	1892	1896	..	2	..	4 3·4-in., 2 M.	1	21·0 t	120	115
3rd cl. cr.	Condor	1614	246	33½	15	2930	Hamburg	1892	1892	..	3	..	8 4·1-in., 7 M.	2	16·5 t	300	165
3rd cl. cr.	Cormoran	1614	246	33½	15	2930	Danzig	1892	1893	..	3	..	8 4·1-in., 7 M.	2	16·0	300	165
g. b.	Eber	962	206¾	30¼	10¾	1300 T.S.	Danzig	1903	..	91,000	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·0	240	121
„ „	Falke	1555	246	33½	15	2900	Kiel	1891	1902	..	3	..	8 4·1-in., 7 M.	2	15·5 t	300	165
3rd cl. cr.	Frauenlob . shd.	2672	328	38½	16	8000 T.S.	Bremen (Weser)	1902	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	21·0	700	249
2nd cl. cr.	Freya	5569	344½	57	20¾	10,000 Nic.	Danzig	1897	1898	..	4 N.S.	4 N.S.	2 8·2-in., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·5 t	825	465
3rd cl. cr.	Gazelle . shd.	2600	328	38½	16¾	6400 Nic.	Kiel (Germania)	1898	1898	225,000	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	3 (1sub.)	18·0	560	210
2nd „	Gefion	4044	344½	42¾	20¾	9000	Danzig (Schichau)	1893	1894	..	1½	..	10 4·1-in., 6 2·1-in., 1 l., 8 M.	2	19·0	780	302
3rd „	Geier . shd.	1597	249¼	34¾	15½	2960	Wilhelmshaven	1894	1896	..	3	..	8 4·1-in., 7 M.	2	16·2 t	300	165
3rd cl. cr.	Greif	1971	318	32	14¾	5400	Kiel	1886	1887	..	..	..	2 3·4-in., 4 M.	..	19·0	350	170
g. v.	Habicht	848	174	29½	11½	600	Elbing	1879	1880	33,054	..	..	5 4·9-in., 5 M.	..	12·0	100	130
3rd cl. cr.	Hamburg . shd.	2952	341	43¼	16½	10,000 W.T.	Stettin (Vulcan)	1903	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	800	249
2nd cl. cr.	Hansa . shd.	5791	345½	57¾	21¾	10,000 B.	Stettin (Vulcan)	1898	1899	..	4 N.S.	4 N.S.	2 8·2-in., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·5	825	465
d.v.	Hela	1971	328	36	14¾	5860	Bremen	1895	1896	..	1½	..	4 3·4-in., 6 1·9-in., 2 M.	3	20·0	500	178
2nd cl. cr.	Hertha	5569	344½	57	21¾	10,000 B.	Stettin (Vulcan)	1897	1898	..	4 N.S.	4	2 8·2-in., 8 6-in., 10 3·4-in., 10 1·4-in., 4 M.	3 (sub.)	19·5 t	825	465
g. b.	Iltis . shd.	881	203½	29¾	10¾	1300 T	Danzig (Schichau)	1898	1898	100,000	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·5 t	165	121
2nd cl. cr.	Irene † . shd.	4330	308	46	21	8000	Stettin	1887	1888	220,000	3	..	4 5·9-in., 8 4·1-in., 6 1·9-in., 1 l., 8 M.	4	19·8 t	540	365
to. g. b.	Jagd	1230	275½	31½	13¾	4000	Bremen	1888	1889	..	2	..	4 3·4-in., 2 M.	3	20·0	230	141
g. b.	Jaguar . shd.	881	203½	29¾	10¾	1300 T.	Danzig (Schichau)	1898	1899	90,000	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·5 t	165	121
1st cl. cr.	Kaiserin Augusta † shd.	5956	387	52½	23	14,000	Kiel (Germania)	1892	1896	..	3½	..	12 5·9-in., 8 3·4-in., 2 l., 8 M.	5	21·0	850	436
g. b.	Luchs	962	206¾	30¼	10¾	1300 T.	Danzig	1899	1900	91,000	..	..	8 3·4-in., 6 1·4-in., 2 M.	..	13·5 t	240	121
3rd cl. cr.	M.* . shd.	2952	361	39½	16½	5000 W.T.	Bremen (Weser)	Bldg.	..	254,500	..	..	10 4-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	800	..
3rd cl. cr.	Medusa . shd.	2617	328	38½	16	8000 T.S.	Bremen (Weser)	1900	1901	247,000	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	560	249
„ „	Merkur (ex Arcona) shd.	2335	236¼	42½	18½	2400	Danzig	1885	1886	109,875	..	..	10 5·9-in., 4 4·1-in., 10 M., 1 l.	1	14·0	300	268
„ „	Lübeck	2952	341	43¼	16½	10,000 W.T.	Stettin (Vulcan)	Bldg.	..	254,500	2	..	10 4-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	800	..
d. v.	Meteor	931	262½	29½	11½	4500	Gaarden	1890	1982	..	2	..	2 3·4-in., 2 M.	3	21·0	120	90
3rd cl. cr.	Meteor*	2952	341	43¼	16½	10,000	Bremen (Weser)	Pro.	..	254,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (sub.)	22·0	800	..
„ „	N.*																
3rd cl. cr.	Niobe . shd.	2617	328	38½	15	8000 T.	Bremen (Weser)	1899	1901	217,500	2	..	10 4·1-in., 12 1·4-in., 4 M., 2 l.	2 (1sub.)	20·0	560	250
3rd cl. cr.	Nymphe . shd.	2617	328	38½	15	8000 T.S.	Kiel (Germania)	1899	1901	217,500							

* Estimates of 1904. The gun-vessel C, 977 tons, is to be built in 1904. † To be partially reconstructed. £25,000 voted 1903.

GERMANY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			kts.	tons.	
g. b.	Panther	962	206¾	30¼	10¾	1300 T.S.	Danzig	1901	1902	91,000	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13 5 *t*	240	121
r.	Pelikan (mining ship)	215	259	38	14½	3000	Kiel	1890	1891	..	..	..	4 *3·4-in.*, 4 M.	..	15·4 *t*	370	183
3rd cl. *cr*	Pfeil	1360	246	32¾	13½	2700	Wilhelmshaven	1882	1883	73,605	..	..	4 *3·4-in.*, 4 M.	1	16·0	180	135
2nd cl. *cr.*	Prinzess Wilhelm shd.	4330	339½	46	21	8000	Gaarden	1887	1888	220,000	3	..	4 *5·9-in.*, 8 *4·1-in.*, 6 *1·9-in.*, 1 l., 8 M.	4	18·7 *t*	540	365
g. v.	Schwalbe	1102	203	30½	12¼	1500	Wilhelmshaven	1887	1887	..	3	..	8 *4·1-in.*, 7 M.	..	13·5 *t*	264	117
3rd cl. *cr.*	Seeadler	1614	246	33½	15	2800	Hamburg	1892	1892	..	3	..	8 *4·1-in.*, 7 M.	2	16·0	300	165
g. v.	Sperber	1102	236	29¾	12½	1500	Wilhelmshaven	1888	1889	..	3	..	8 *4·1-in.*, 6 M.	..	13·5 *t*	264	117
3rd cl. *cr.*	Thetis. shd.	2617	344½	38½	16	8000 T.S.	Danzig	1900	1901	247,000	2	..	10 *4·1-in.*, 12 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·8 *t*	560	249
g. b.	Tiger	880	203½	29¾	10	1300 T.S.	Danzig	1899	1900	..	..	..	8 *3·4-in.*, 6 *1·4-in.*, 2 M.	..	13·5 *t*	240	121
" "	Undine shd.	2617	328	38½	16	8000 T.S.	Kiel (Howaldt)	1902	..	254,500	2	..	10 *4·1-in.*, 12 *1·4-in.*, 4 M., 2 l.	2 (sub.)	21·0	700	249
2nd cl. *cr.*	Victoria Luise	5569	344½	57	21¾	10,000 Dürr.	Bremen	1897	1898	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465
" "	Vineta shd.	5791	345½	57¾	21¾	10,000 Dürr.	Danzig	1897	1899	..	4 H.S.	4 H.S.	2 *8·2-in.*, 8 *6-in.*, 10 *3·4-in.*, 10 *1·4-in.*, 4 M.	3 (sub.)	19·5 *t*	825	465

The Sophie, Charlotte, Marie, Mars, Grille, Hay, Ulan, Brummer, Nixe, Olga, Rhein, Moltke, Stein, and Stosch are used as schoolships. The Blücher (2856 tons), built at Kiel in 1877, is the torpedo training ship, and the Carola (2169 tons), built at Stettin in 1880, the gunnery ship.

The Imperial Yacht Hohenzollern, 4187 tons, 9460 I.H.P., 22 knots, carries 8 1·9-in. Q.F., but provision is made for mounting 3 4·1-in., 12 1·9-in. Q.F. and 4 M.

The station vessel for Constantinople is named the Loreley. The Vorwärts and Schamien, gunboats, are converted trading vessels for river service in China.

A river gunboat for China, the Tsingtau, has been launched at Danzig (Schichau).

Merchant Cruisers (Auxiliaries to the German Navy).

To what Company belonging.	Name of Ship.	Register Tonnage.	Length.		Beam.		Draught of Water.		Indicated H.P.	Ocean Speed.	When Built.	Armament of each Ship.
		tons.	ft.	in.	ft.	in.	ft.	in.		knots.		
Hamburg-American S.S. Co.	Fürst Bismarck	8430	504	4	57	6	22	3	16,410	19½	1891	The armament is of 6-in. and smaller quick-firers.
	Auguste Victoria	8479	522	2	56	4	23	0	12,280	18½	1889	
	Deutschland	16,502	662	7	67	0	29	3	37,000	23½	1900	
	Columbia	7241	461	6	55	8	21	10	13,680	18½	1889	
	Hamburg	10,600	499	3	60	1	..		1016(*a*)	16	1889	
	Kiautchau	10,911	522	5	60	1	..		1016(*a*)	16	1900	
North German Lloyd	Lahn	5100	449	6	49	0	22	0	9500	18	1887	
	Kronprinz Wilhelm	14,800	640	0	66	0	26	3	30,000	23½	1901	
	Kaiser Wilhelm der Grosse	14,349	625	0	66	0	27	0	28,000	23	1897	
	Kaiser Wilhelm II	19,500	678	0	72	0	..		44,000	24	1902	
	Kaiserin Maria Theresia	8286	526	0	52	0	22	2	17,000	19½	1900	
	Aller	5217	436	6	48	0	..		1300(*a*)	16	1885	
	Trave	5262	436	6	48	0	..		1300(*a*)	16	1886	

(*a*) Nominal horse-power.

Many other vessels of the same companies are on the list, steaming at less than 16 knots.

GREECE.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Armour: Gun Position, Heavy Guns.	Armour: Gun Position, Second-ary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Hydra	4808	334½	51¾	23¼	7000	St. Nazaire La Seyne	1889 1900	1891	..	11¾–4	2½	3	..	13½	..	3 *10·6-in.* Canet, 5 *5·9-in.*, 1 *3·9-in.*, 8 *2·5-in.*, 4 *1·8-in.*, 12 *1·4-in.*	3	17·0	600	400
b.	Psara	4808	334½	51¾	23¼	7000	Havre La Seyne	1890 1897	1892	..	11¾–4	2½	3	..	13½	..					
b.	Spetsai	4808	334½	51¾	23¼	7000	Havre La Seyne	1889 1900	1891	..	11¾–4	2½	3	..	13½	..					

GREECE.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour: Deck.	Armour: Gun Position.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.			knots.	tons.	
g.v.	Acheloos	420	130	24½	11½	400	Blackwall	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.	..	10·0	50	..
g.v.	Alphios	420	130	24½	11½	400	Blackwall	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.	..	10·0	50	..
g.v.	Eurotas	420	130	24½	11½	400	Dumbarton	1884	1885	..	..	..	2 *3·7-in.* (K.), 3 M.	..	10·0	50	..
corv.	Sfaktirea	1000	216½	29¼	18	2400	England	1885	1886	..	..	..	2 *3·9-in.* (K.), 2 M.	..	14·5	100	..

Torpedo depôt-ship.—Kanaris, 1100 tons, 500 I.H.P., 2 3·9-in. (Krupp) guns, 2 Whitehead torpedo-launching guns on broadside, 2 under-water torpedo tubes ahead; 14 knots speed. Gunboats, Ambrakia and Aktion, of 440 tons displacement, 380 horse-power, 10 knots speed, fitted with 1 10·2-in. Krupp gun and 2 machine guns; launched 1885; 4 gunboats, A. β. Γ. Δ. (52 tons, 1 4·7-in. Krupp), launched 1881; and 3 mining vessels (300 tons), launched 1881.

It is stated that three cruisers are to be built by Italian firms.

ITALY.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	ins.	ins.	ins.	ins.	ins.			knots.	tons.	
t.	Affondatore	3851	290	40	20	3240	Millwall	1865	1868	197,600	5 iron.	2	..	..	5 iron.	..	2 28-ton (A.), 6 4·7-in., 2 2·9-in., 4 2·2-in., 4 1·4-in., 2 M.	2	12·0	460	303
"	Ammiraglio di St. Bon	9645	344½	69¼	24¾	13,500	Venice	1897	1901	..	9¾–4 H.S.	3–1½	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 10-in., 8 6-in., 8 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	4	18·3 t	600	548
b.	Andrea Doria	11,027	328½	65¼	27¼	10,500	Spezia	1885	1889	765,500	18 comp.	3	18 comp.	14 comp.	18 comp.	..	4 105-ton (A.), 2 6-in., 4 4·7-in., 2 2·9-in., 10 2·2-in., 17 1·4-in., 2 M.	5 (2sub.)	16·1 t	850	526
b.	Benedetto Brin	13,214	426½	78¼	27¼	19,000 B.	Castellamare	1901	..	..	6–2 H.S.	3	6 H.S.	8 H.S.	10 H.S.	6 H.S.	4 12-in., 4 8-in., 12 6-in., 16 3-in., 8 1·8-in., 4 M.	4 (sub.)	19·5 t	1000 / 2000	719
a.c.	Carlo Alberto	6396	325	59	23	13,220 t	Spezia	1896	1898	..	6–4½ H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 6-in., 6 4·7-in., 2 2·9-in., 10 2·2-in., 10 1·4-in., 2 M.	4	19·2 t	1000	500
t.	Dandolo *	12,071	341	64¾	26½	8045	Spezia	1878 1898	1881	872,640	21½	2	17	16	10 H.S.	2 screens	4 10-in. (A.), 7 6-in., 5 4·7-in., 2 2·9-in., 10 2·2-in., 14 1·4-in., 2 M.	4	15·6 t	732	506
t.	Duilio	10,962	341	64¾	26½	7710	Castellamare	1876	1880	850,400	21½	2	17	16	18	..	4 100-ton M.L.R. (A.), 3 4·7-in., 2 2·9-in., 8 2·2-in., 22 1·4-in., 2 M.	3	15·0	1000	487
t.	Emanuele Filiberto	9645	344½	69¼	24¾	13,500	Castellamare	1897	1902	..	9¾–4 H.S.	3–1	6 H.S.	6 H.S.	9¾ H.S.	6 H.S.	4 10-in., 8 6-in., 8 4·7-in., 2 2·9-in., 8 2·2-in., 12 1·4-in., 2 M.	4	18·3 t	600	536
b.	Francesco Morosini	11,145	328¼	65¼	27¼	9560	Venice	1885	1889	770,680	18 comp.	3	18 comp.	14 comp.	18 comp.	..	4 105-ton (A.), 2 6-in., 4 4·7-in., 2 2·9-in., 10 2·2-in., 17 1·4-in., 2 M.	5 (2sub.)	17·0	850	509
a.c.	Francesco Ferruccio	7294	344	59¾	23¼	13,500 Nic.	Venice	1902	..	..	6–3 H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 10-in., 2 8-in., 14 6-in., 10 2·9-in., 6 1·8-in., 2 M.	4 (sub.)	20·0	655 / 1200	540
a.c.	Giuseppe Garibaldi					14,713 t Nic.	Sestri-Ponente (Ansaldo)	1899	1901												
b.	Italia †	15,407	400½	74	31¼	11,986 t	Castellamare	1880	1884	1,167,680	16 funnel op'nings	3	..	..	19 comp.	..	4 100-ton (A.), 8 6-in., 4 4·7-in., 12 2·2-in., 24 1·4-in., 2 M.	4	18·0 t	1200	748

* New armament given. The reconstruction of the Duilio is not likely to be proceeded with.

† To receive new boilers, draught to be lightened, partial new hull to be built external to the old one, increasing beam to 82 feet.

ITALY.—Armoured Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Compl't'on.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			kts.	tons.	
b.	Lepanto	15,549	400½	74	31¼	15,800 *t*	Leghorn (Orlando)	1883	1887	1,150,880	16 funnel op'nings	3	..	..	19 *comp.*	..	4 *100-ton* (A.), 8 *6-in.*, 4 *4·7-in.*, 12 *2·2-in.*, 34 *1·4-in.*, 2 M.	4	18·38 *t*	1650	748
a.c.	Marco Polo	4511	327	48¼	19½	10,543 *t*	Castellamare	1890	1895	344,400	4	1	4	4	4	..	6 *5·9-in.*, 10 *4·7-in.*, 2 *2·9-in.*, 9 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 (1sub.)	19·0 *t*	600	394
b.	Napoli	12,425	435½	73½	27¼	20,000 Nic.	Castellamare	Bldg.	..	1,000,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	4 (2sub.)	22·0	1000 / 2000	..
b.	Regina Elena	12,425	435½	73½	27¼	20,000 B.	Spezia	1903	..	1,000,000											
b.	Regina Margherita	13,214	426½	78¼	27¼	19,000 Nic.	Spezia	1901	..	..	6 H.S.	3	6 H.S.	8 H.S.	8 H.S.	6 H.S.	4 *12-in.* 4 *8-in.*, 12 *6-in.*, 16 *3-in.*, 8 *1·8-in.*, 4 M.	4 (sub.)	19·5	1000 / 2000	719
b.	Re Umberto	13,673	400	76¾	28½	19,500	Castellamare	1888	1893	1,058,500	4	3	4	2¾	18	..	4 *67-ton* (A.), 8 *6-in.*, 16 *4·7-in.*, 2 *9-in.*, 15 *2·2-in.*, 14 *1·4-in.*, 2 M.	8	19·0	1200	785
b.	Roma	12,425	435½	73½	27¼	20,000 B.	Spezia	1904	..	1,000,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	4 (2sub.)	22·0	1000 / 2000	..
b.	Ruggiero di Lauria	10,997	328¼	65¼	27¼	10,600	Castellamare	1884	1887	777,560	18 *comp.*	3	18 *comp.*	14 *comp.*	18 *comp.*	..	4 *105-ton* (A.), 2 *6-in.*, 4 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 17 *1·4-in.*, 2 M.	5 (2sub.)	17·0	910	509
b.	Sardegna	13,640	411	76¾	28½	19,650 *t*	Spezia	1890	1895	1,057,440	4	3	4	2¾	14¼ *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	20·1 *t*	1200	785
"	Sicilia	13,087	400	76¾	28½	19,500	Venice	1891	1895	1,050,000	4	3	4	2¾	18 *comp.*	..	4 *67-ton* (A.), 8 *5·9-in.*, 16 *4·7-in.*, 2 *2·9-in.*, 20 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	19·2 *t*	1200	785
a.c.	Varese	7294	344	59¾	23⅓	13,500 B.	Leghorn (Orlando)	1899	1900	..	6–4½ H.S.	1½	6 H.S.	5 H.S.	6 H.S.	6 H.S.	1 *10-in.*, 2 *8-in.*, 14 6-in., 10 *2·9-in.*, 6 *1·8-in.*, 2 M.	4	20·0	650 / 1200	500
b.	Vittorio Emanuele III.	12,425	435½	73½	27¼	20,000 B.	Castellamare	1903	..	1,000,000	9¾–4 H.S.	2	8 H.S.	8 H.S.	8 H.S.	6 H.S.	2 *12-in.*, 12 *8-in.*, 12 *3-in.*, 12 *1·8-in.*	2 (sub.)	22·0	1000 / 2000	..
a.c.	Vettor Pisani	6396	325	59	23	13,000	Castellamare	1895	1897	..	6 H.S.	1½	6 H.S.	..	6 H.S.	4½ shields	12 *6-in.*, 6 *4·7-in.*, 2 *2·9-in.*, 10 *2·2-in.*, 10 *1·4-in.*, 2 M.	5	20·0	600	504

Another ship of the Vittorio Emanuele class is to be laid down at Castellamare.

ITALY.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.*	Armaments. Guns.	Armaments. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
to.cr	Agordat	1292	287½	30½	11	8000	Castellamare	1899	1900	..	1	..	4 4·7-*in.*, 8 2·2-*in.*, 2 1·4-*in.*	2	22·0	160	158
d.v.	Archimede	772	230	26¼	10	1401	Venice	1887	1888	60,120	..	..	4 4·7-*in.*, 2 2·2-*in.*, 2 1·4-*in.*	2	16·0	210	109
to.g.b.	Aretusa	833	230	26¾	11¾	4420	Leghorn (Orlando)	1891	1892	72,920	1	..	1 4·7-*in.*, 6 2·2-*in.*, 3 1·4-*in.*	6	20·7 *t*	120	111
3rd cl. *cr.*	Calabria	2428	249¼	42	16¾	4094 *t*	Spezia	1894	1897	183,120	2	..	4 5·9-*in.*, 6 4·7-*in.*, 1 2·9-*in.*, 8 2·2-*in.*, 8 1·4-*in.*, 2 M.	2	16·4 *t*	500	257
to.g.b.	Calatafimi	833	229½	27	10¼	4136	Castellamare	1893	1894	72,920	1	..	1 4·7-*in.*, 6 2·2-*in.*, 3 1·4-*in.*	6	20·0	120	111
„	Caprera	833	230	27¼	10¼	4189	Leghorn (Orlando)	1894	1895	72,920	1	..	2 4·7-*in.*, 4 2·2-*in.*, 2 1·4-*in.*	5	21·0	120	111
to.cr.	Coatit	1292	287½	30½	11	8160	Castellamare	1899	1902	..	1	..	4 4·7-*in.*, 8 2·2-*in.*, 2 1·4-*in.*	2	21·1 *t*	160	158
3rd cl. *cr.*	Cristoforo Colombo	2713	249	36	17½	2321	Venice	1892 Rebuilt	1893	157,240	..	..	6 4·7-*in.*, 2 2·2-*in.*, 4 1·4-*in.*	..	16·0	445	238
g.v.	Curtatone	1272	177¼	32¾	13½	1100	Venice	1887	1888	58,440	..	..	4 2·2-*in.*, 2 1·4-*in.*, 2 M.	..	12·0	197	131
g.b.	Cyclope	831	..	..	..	2298	Naples	1903	1903	..	..	..	..	..	15·0	..	..
3rd cl. *cr.*	Dogali	2055	250	37	14½	7600	Elswick	1887	1889	156,040	2	4½	6 6-*in.* (A.), 1 2·9-*in.*, 9 2·2-*in.*, 2 1·4-*in.*, 2 M.	4	19·66 *t*	480	257
„	Elba . . shd.	2689	272½	40¾	16½	7471 *t*	Castellamare	1893	1895	200,000	2	4½	4 5·9-*in.*, 6 4·7-*in.*, 1 2·9-*in.*, 8 2·2-*in.*, 8 1·4-*in.*, 2 M.	2	17·9 *t*	500	272

* Shields.

ITALY.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
2nd cl. *cr.*	Etna	3470	282¼	42½	19	6169	Castellammare	1885	1887	226,720	1½	5	2 *9·8-in.* (A.), 6 *5·9-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	4	17·8	630	315
to.g.b.	Euridice	905	229½	27	10¼	4162	Castellamare	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	19·8 *t*	120	111
3rd cl. *cr.*	Etruria	2245	262½	39½	16¼	7585 *t*	Leghorn (Orlando)	1891	1893	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·84 *t*	400	257
2nd cl. *cr.*	Fieramosca	3534	290	43½	19¼	7700	Leghorn (Orlando)	1888	1890	240,120	1½	5	2 *9·8-in.*, 6 *6-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	4	17·5 *t*	450	315
d.v.	Galilei	886	230	26¼	8¼	1384	Venice	1887	1888	56,720	..	..	4 *4·7-in.*, 2 *2·2-in.*, 2 *1·4-in.*	2	15·0	210	109
3rd cl. *cr.*	Giovanni Bausan	3277	275½	42½	18¼	6500	Elswick	1883	1885	179,120	1½	5	2 *9·8 in.* (A.), 6 *5·9-in.*, 1 *2·9-in.*, 4 *2·2-in.*, 8 *1·4-in.*, 2 M.	3 (1sub.)	17·5 *t*	600	295
to.g.b.	Goito	843	230	25½	11¾	2620	Castellamare	1887	1888	70,680	1	..	4 *2·2-in.*, 5 *1·4-in.*	5	19·0	130	111
g.v.	Governolo	1235	185	33¾	13¾	1100	Venice	1894	1896	58,440	..	..	4 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	13·0	200	131
to.g.b.	Iride	931	229½	27	10¼	4242	Castellamare	1891	1892	72,920	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	19·6 *t*	120	111
3rd cl. *cr.*	Liguria	2245	262½	39¼	16¾	7677 *t*	Sestri (Ansaldo)	1893	1894	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 2 M.	2	19·6 *t*	430	257
" "	Lombardia	2351	262½	39½	16½	6843 *t*	Castellamare	1890	1892	183,120	2	4½	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	17·0 *t*	430	257
to.g.b.	Minerva	833	216	27½	11¾	4800 W.T.	Sestri (Ansaldo)	1892	1893	72,720	1	..	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	5	21·0	120	111
to.g.b.	Montebello	801	230	25½	11¾	2776	Spezia	1888	1899	74,120	..	1	6 *2·2-in.*, 2 *1·4-in.*	4	18·0	100	111
"	Partenope	821	246	27½	11¾	4200	Castellamare	1890	1890	71,000	..	1	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	5	19·0	100	111
3rd cl. *cr.*	Piemonte	2597	300	38	15	12,000	Elswick	1888	1890	220,000	3	3	6 *6·6-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 6 *1·4-in.*, 4 M.	3	21·0	560	325
" "	Puglia	2498	269	41	16¾	7000	Taranto	1898	1900	200,000	4½	1	4 *5·9-in.*, 6 *4·7-in.*, 1 *2·9-in.*, 8 *2·2-in.*, 8 *1·4-in.*, 2 M.	2	20·0	650	257
d.v.	Rapido	1568	262½	30½	12½	1450	Leghorn (Orlando)	1876	1877	77,400	..	..	5 *2·2-in.*, 2 M.	1	13·4 *t*	300	135
to.g.b.	Saetta	395	187	19¾	6½	2400	Castellamare	1887	1888	38,880	..	..	2 *2·2-in.*, 4 *1·4-in.*	3	20·0	90	70
2nd cl. *cr.*	Stromboli	3836	282¼	42½	19	6298	Venice	1886	1888	220,080	5	1·5	2 *9·8-in.* (A.), 6 *5·9-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	4	17·0	600	315
to.g.b.	Tripoli	885	230	25¾	11¾	2543	Castellamare	1886	1887	72,080	..	1	7 *2·2-in.*	4	18·0	130	107
3rd cl. *cr.*	Umbria	2245	262½	39½	16½	7104 *t*	Leghorn (Orlando)	1891	1893	183,120	4½	2	4 *5·9-in.*, 6 *4·7-in.*, 8 *2·2-in.*, 10 *1·4-in.*, 1 1., 2 M.	2	18·83 *t*	430	257
to.g.b.	Urania	833	230	27	11¼	4397	Sestri (Odero)	1891	1892	72,920	..	1	1 *4·7-in.*, 6 *2·2-in.*, 3 *1·4-in.*	6	20·0	120	111
2nd cl. *cr.*	Vesuvio	3373	282¼	42½	19	6820	Leghorn (Orlando)	1886	1888	218,320	5	1·5	2 *9·8-in.*, 6 *5·9-in.*, 1 *2·9-in.*, 5 *2·2-in.*, 8 *1·4-in.*, 2 M.	4	17·0	600	315
g.v.	Volturno	1155	177½	32¾	14¼	1100	Venice	1887	1888	58,960	..	..	4 *4·7-in.*, 4 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	13·0	206	131

Subsidised auxiliary cruisers and despatch vessels.—Nord America, Vittoria, Duca de Galliera, and Duchessa di Genova (La Veloce S.S. Co.), Regina Margherita, Elettrico, Candia, Malta, Perseo and Orione (Navigazione Generale). The armament of these vessels is 2 2·2-in. Q.F., and 4 1·4-in. M. Amerigo Vespucci, 2795 tons, and Flavio Gioja, 3064 tons, 3rd class cruisers, used for training purposes.

JAPAN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.*	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
l.	Asahi	15,200	400	75¼	27¼	15,000 B.	Clydebank	1899	1900	..	9–4 H. S.	4–2½	6 H.S.	12 H.S.	14 H. S.	6 H.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*	4 (sub.)	18	1400	750
a.c.	Asama	9750	408	67	24¼†	19,000 *t*	Elswick	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6	6 H.S.	4 *8-in.*, 14 *6-in.* (A), 12 *12-pr.*, 7 *2½-pr.*	5 (4 sub.)	22·3 *t*	600 / 1200	482
,,	Azuma	9436	445¾	59½	28	17,000 B.	St. Nazaire	1899	1901	..	7–3½ H. S.	3	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *1·8-in.*	5 (4 sub.)	20·0	..	482
b.	Chin-Yen	7400	308½	59	20	6200	Stettin	1882	1884	..	14	3	12	..	12	..	4 *12-in.* (K.), 4 *6-in.*, 8 l., 8 M.	3	14	1000	250
a.c.	Chiyoda	2450	308	42½	14	5700 B.	Clydebank	1889	1890	..	4½	1–2	..	..	..	..	10 *4·7-in.*, 14 *3-pr.*, 3 M.	3	17·5	420	300
b.	Fuji	12,320	374	73	26½	14,000	Thames	1896	1897	..	18–6 H. S.	4–2½	4 H.S.	..	14 H. S.	6 H.S.	4 *12-in.*, 10 *6-in.*, 20 *3-pr.*, 4 *4½-pr.*	5 (4 sub.)	19·2 18·5 *t*	1100	600
,,	Hatsuse	15,000	400	76½	27	16,300 B.	Elswick	1899	1900	..	9–4 H.N.S.	4–2½	6 H.N.S.	12 H.N.S.	14 H N.S	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*	4 (sub.)	19·11 *t*	1100 / 1400	741
c.d.s.	Hei-Yen	2000	200	40	16	2400	Foo Chow	1890	1894	..	8	2	..	..	5	..	1 *10·2-in.* (K.), 2 *5·9-in.*, 6 M.	4	11·0	350	250
a.c.	Idzumo	9750	400	68½	24¼†	17,300 B.	Elswick	1899	1901	..	7–3½ H.N.S.	2½	5 H.N.S.	..	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 12 *12-pr.*, 8 *2½-pr.*	4 (sub.)	21·0	700 / 1600	672
,,	Iwate							1900	1901										21·8 *t*		
,,	Kasuga (ex Rivadavia)	7700	344	59¾	24¼	13,500	Sestri Ponente	1902	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H. N.S.	6 H. N.S.	6 H. N.S.	1 *10-in.*, 2 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8 in.*, 2 M.	4	20.0	600 / 1150	500
b.	Mikasa	15,200	400	76	27¼	15,000 B.	Barrow	1900	1902	..	9–4 H.N.S.	3	6 H. N.S.	12 H.N.S.	14 H. N.S.	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 *3-pr.*, 4 *2½-pr.*	(4 sub.)	18·6 *t*	700 / 1520	935
a.c.	Nisshin (ex Moreno)	7700	344	59¾	24¼	13,500	Sestri Ponente	1903	1904	760,000	6 H. N.S.	1½	6 H. N.S.	6 H.N.S.	6 H. N.S.	6 H. N.S.	4 *8-in.*, 14 *6-in.*, 10 *3-in.*, 6 *1·8-in.*, 2 M.	4	20.0	600 / 1150	500
b.	Shikishima	14,850	400	75½	27¼†	14,500 B.	Thames	1898	1899	..	9–4 H.N.S.	4–2½	6 H. N.S	12 H.N.S.	14	6 H. N.S.	4 *12-in.*, 14 *6-in.*, 20 *12-pr.*, 8 M.	5 (4 sub.)	18·5	700	741
a.c.	Tokiwa	9750	408	67	24¼†	20,000	Elswick	1898	1899	..	7–3½ H. S.	2	5 H.S.	..	6 H. S.	6 H.S.	4 *8-in.* 14 *6-in.* (A.), 12 *12-pr.*, 7 *2½-pr.*	5 (4 sub.)	23·0	600 / 1200	500
,,	Yakumo	9850	407¾	64¼	23¾	16,000 B.	Stettin	1899	1901	..	7–3½ H. S.	2½	5 H.S.	..	6 H. S.	6 H S.	4 *8-in.* (A.), 12 *6-in.*, 12 *12-pr.* (A.), 7 *2½-pr.*	5 (4 sub.)	20·0	600 / 1100	500
b.	Yashima	12,320	374	73	26½	14,000	Elswick	1896	1897	..	18–6 H. S.	4–2½	4 H.S.	..	14 H. S.	6 H.S.	4 *12-in.*, 10 *6-in.*, 20 *3-pr.*, 4 *4½-pr.*	5 (4 sub.)	19·2 18·5 *t*	1100	600
,,	Two unnamed	16,400	..	..	..	..	Elswick / Barrow	Bldg.	..	..	..	..	..	..	..	..	.. .. ..	..	18½	..	..

* All Q.F. guns and 12-in. for new ships are Armstrong.　　† Mean draught.

The old ironclads Hi-yei and Kon-go, of 2200 tons displacement, are now used as training ships; armament, 3 6·6-in. Krupps and 6 5·9-in.

The old central battery ironclad *Fu-So* (3718 tons) built on the Thames, 1877, and sunk off Shikoku Island, 1897, was refloated and repaired.

JAPAN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.v.	Akagi	615	164	27	10	700	Yokosuka . .	1889	1891	..	..	..	1 *8·2-in.*, 1 *5·9-in.*, 2 l., 2 M.	..	13·0	..	113
cr.	Akashi . . .	2657	306¾	40	16¼	8500	Yokosuka . .	1895	1897	327,000	2	4½ shield	2 *6-in.* (A.), 6 *4·7-in.*, 12 *3-pr.*, 4 M.	2	20·0	200	..
"	Akitsushima . .	3150	302	42½	18¼	8400	Yokosuka . .	1892	1893	..	3	..	4 *6-in.*, 6 *4·7-in.*, 10 *3-pr.*	4	19·0	..	330
g.v.	Atago	615	154	27	10½	700	Yokosuka . .	1887	1888	..	..	..	1 *8·2-in.*, 1 *4·7-in.*, 2 M. .	..	12·0	60	113
t.g.b.	Chihaya . . .	1250	240	27½	13	5500 Nor.	Yokosuka . .	1900	1901	..	..	..	2 *4·7-in.*, 4 *3-pr.*	5	21·0	200	..
cr.	Chitose . . .	4760	396	49	17½	15,500	San Francisco .	1898	1899	205,200	4½	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 2 *6-pr.*, 2 *2½-pr.*	5	22·5	350/1000	405
"	Hashidate . . .	4277	295	50¾	21¼	5400	Yokosuka . .	1891	1893	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.* 11 *3-pr.*, 6 M.	4	17·0	400	350
"	Itsukushima . .	4277	295	50¾	21½	5400	La Seyne . .	1891	1893	..							
g.v.	Iwaki	700	147	25	11	700	Yokosuka . .	1883	1884	..	..	..	1 *5·9-in.*, 2 *4·7-in.* . .	..	10·0	600	115
"	Idzumi . . .	2800	270	40	18¼	6500	Elswick . .	1878 1892	1879	..	3	2¼ shield	2 *6-in.*, 6 *4·7-in.*, 7 *6-pr.*, 2 M.	..	17.4 *t*	400	300

JAPAN.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons	
cr.	Kasagi	5416	393½	48¾	19	15,797	Philadelphia	1897	1898	205,200	4½–1¾	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *1·8-in.*	5	22·5 *t*	350 / 1000	405
t.c.	Katsuraki	1476	206¾	36	15	1600	Yokosuka	1885	1887	..	..	..	2 *6-in.* (K.), 5 *4·7-in.*, 2 M.	2	13·0	..	242
t.c.	Musashi																
g.v.	Maya	615	154	27	10	700	Yokosuka	1886	1887	..	..	..	1 *8·2-in.*, 1 *4·7-in.*, 2 M.	..	13·0	60	113
cr.	Matsushima	4277	295	50¾	21¼	5400	La Seyne	1890	1892	..	2	12	1 *12·5-in.* (Canet), 11 *4·7-in.*, 5 *6-pr.*, 11 *3-pr.*, 6 M.	4	17·5 *t*	400	350
,,	Miyako	1800	314¾	36	13¾	6130	Kure	1899	1901	..	..	..	2 *4·7-in.*, 10 *1·8-in.*	2	20·0	..	..
cr.	Naniwa	3650	300	46	18½	7235	Elswick	1885	1886	..	3	1½ shield	2 *10·2-in.* (A.), 6 *5·9-in.*, 2 *3-pr.*, 10 M.	4	18·72 *t*	800	350
,,	Niitaka	3420	235½	44	16½	10,000 Nic.	Yokosuka	1902	..	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.*	..	20·0	600	..
g.v.	Oshima	630	164	27	10	700	Yokosuka	1890	1891	..	..	..	4 *4·7-in.*, 8 l.	..	13·0	..	..
cr.	Sai yen (ex Tsi Yuen)	2264	263½	33	15¾	2800	Stettin	1883	1895	..	3	9	2 *8·2-in.*, 1 *5·9-in.*, 4 l. 10 M.	4	14·5 *t*	230	20
,,	Suma	2657	306¾	40	16¼	8500	Yokosuka	1896	1898	237,000	2 shield	4½ 4 M.	2 *6-in.*, 6 *4·7-in.*, 12 *3-pr.*	2	20·0	200	..
,,	Takao	1774	230	33	13	2330	Yokosuka	1888	1889	..	..	..	4 *6-in.*, 1 *4¾-in.* do., 6 M.		15·0	300	255
,,	Takachiho	3700	300	46	18½	7500	Elswick	1885	1886	..	3	1½ shield	2 *10·2-in.* (A.), 6 *5·9-in.*, 2 *3-pr.*, 10 M.	4	18·7 *t*	800	365
,,	Takasago	4160	360	46½	17	15,500 B.	Elswick	1897	1898	..	4½	4½ shield	2 *8-in.*, 10 *4·7-in.*, 12 *12-pr.*, 6 *2½-pr.*	5	23·0	800 / 1000	..
to.g.b.	Tatsuta	875	240	27½	13	5500	Elswick	1894	1894	..	..	..	2 *4·7-in.*, 4 *3-pr.*	5	21·0	200	..
,,	Ten-riu	1500	200	32	16½	1250	Japan	1882	1885	..	..	..	1 *6·6-in.* (K.), 6 *4·7-in.*, 2 l.	..	12·0	256	222
cr.	Tsukushi (*ex* Arturo Prat)	1350	210	32	15	2887	Elswick	1882	1893	..	..	..	2 *10-in.* (A.), 4 *4·7-in.*, 2 l., 4 M.	2	16·5 *t*	250	190
,,	Tsushima	3420	235½	44	16½	10,000 Nic.	Kuro	Bldg.	..	..	2½	..	6 *6-in.*, 10 *3-in.*, 4 *2½-pr.*	..	20·0	600	..
,,	Yayeyama	1600	315	34½	15	6000 Nic.	Yokosuka	1889	1890	..	..	..	3 *4·7-in.*, 6 M.	2	20·0	..	200
,,	Yamato	1476	206¾	36	15	1600	Yokosuka	1885	1886	..	..	..	2 *6·6-in.* (K.), 5 *4·7-in.*, 4 M.	2	13·0	..	242
,,	Yoshino	4180	350	46½	17	15,000	Elswick	1892	1893	..	4½	4½ shield	4 *6-in.*, 8 *4·7-in.*, 23 *3-pr.*	5	23·0	1000	300

The gunboats Chen-Pei, Chen Pien, Chen Nan, Chen Hsi, Chen Chung and Chen Tung (440 tons) were captured from the Chinese.
A cruiser of 2600 tons and 21 knots, the Otowa, is in hand at Yokosuka, and a gunboat of 620 tons, the Uji, at Kure.
Messrs. Thornycroft have built a river gunboat of 13·27 knots speed.

NETHERLANDS.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
c.d.s.t.	De Ruyter . .	5295	316¾	51½	21¾	6000 Y.	Amsterdam .	1900	1901	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 *9·4-in.*, 4 *5·9-in.*, 8 *2·9-in.*, 4 *1·4-in.*	3 2 sub.	16·0	680	441
„	Evertsen . . .	3346	282¾	47	16¾	4735	Flushing .	1894	1896	..	6–4 H.S.	2	..	..	9½ H.S.	3 H.S.	3 *8·2-in.*, 2 *5·9-in.*, 6 *2·9-in.*, 8 *1·4-in.*	3	16·0	280	260
„	Hertog Hendrik .	4872	316¾	51½	21¾	6000 Y.	Amsterdam .	1902	1903	347,500	6 H.N.S.	2	..	..	10 H.N.S.	..	2 *9·4-in.*, 4 *5·9-in.*, 8 *2·9-in.*, 4 *1·4-in.*, 2 l.	3	16·5	680	441
„	Koningin Regentes	4872	316¾	51½	21¾	6000 Y.	Amsterdam .	1900	1902	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 *9·4-in.*, 4 *5·9-in.*, 8 *2·9-in.*, 4 *1·4-in.*, 2 l.	3 2 sub.	16·0	680	441
t. & b.	Koningin Wilhelmina der Nederlanden * (I) shd.	4527	327½	48¾	20	5900	Amsterdam .	1892	1894	..	..	3	..		11	..	1 *11-in.*, 1 *8·2-in.*, 2 *6·6 in.*, 2 *2·9-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 6 *1·4-in.*, 2 M.	4	16·5	448	274
c.d.s.t.	Kortenaer . .	3346	282¾	47	16¾	4658	Amsterdam .	1894	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 *8·2-in.*, 2 *5·9-in.*, 6 *2·9-in.*, 8 *1·4-in.*	3	16·0	280	260
„	Piet-Hein . .	3346	282¾	47	16¾	4736 t	Rotterdam .	1894	1896	..	6 H.S.	2	..	..	9½ H.S.	3 H.S.	3 *8·2-in.*, 2 *5·9-in.*, 6 *2·9-in.*, 8 *1·4-in.*	3	16·2 t	280	260
t. & b.	Reinier Claeszen .	2440	229½	44¼	15	350	Amsterdam .	1891	1892	..	4¾–2 comp.	3	..	..	11 comp.	6 comp. shield	1 *8·2-in.* (*K.*), 1 *6·6-in.*, 1 *2·9-in.*, 4 *1·9-in.*, 3 *1·4-in.*	2	12·5 t	88	160
c.d.s.t.	Schorpioen . .	2235	205	38	16½	2225	La Seyne .	1868	1870	..	6	1	..	..	11	..	1 *11-in.* (*K.*), 2 *2·9-in.*, 5 *3-pr.*, 2 M.	..	13·0	200	160
„	Stier . . .	2112	205	38	16¼	2250	Birkenhead .	1868	1870	..	11	1	..	..	8	..	1 *11-in.* (*K.*), 2 *2·9-in.*, 5 *3-pr.*, 2 M.	..	12·4 t	160	154
c.d.s.t.	Tromp / No. 5 . . .	5295	316¾	51½	21¾	6000 Y.	Amsterdam .	Bldg.	..	347,500	6–4 H.N.S.	2	..	..	10 H.N.S.	..	2 *9·4-in.*, 4 *5·9-in.*, 8 *2·9-in.*, 4 *1·4-in.*, 2 l.	3 2 sub	16·0	680	441

* Has received new engines and boilers.

Two coast defence vessels of 850 tons and three monitors of 680 tons, projected.

Also the old coast defence monitors (launched 1868–78) Matador, Draak, Luipaard, Wesp, Haai, Hyena, Panter, Bloedhond, Cerberus, Krokodil and Heiligerlee, 2000 tons to 1,500 tons.

NETHERLANDS.—Cruising Ships.

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	inches.	inches.			knots.	tons.	
g. r. . .	Borneo (I) . . shd.	800	176½	31	13¼	1040	Glasgow .	1892	1893	..	..	..	6 *4·1-in.*, 1 *2·9-in.*, 2 *1·4-in.*, 2 M.	..	13·0	124	106
,, . .	Ceram (I) . . shd	541	173¼	25½	10¼	800	Flushing .	1887	1888	..	..	..	3 *4·7-in.* (K.), 1 *2·9-in.*, 2 *1·4-in.*.	..	12·5 *t*	70	82
,, . .	Condor (I) . . shd.	344	126	20	10	300	Amsterdam .	1885	1886	..	..	..	1 *2·3-in.*, 2 *2-in.*	..	10·0	26	40
g. v. . .	Edi (I)	797	166	30¾	11¾	1100	Flushing .	1897	1898	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	113	95
,, . .	Flores (I) . . shd.	541	173½	25½	11½	650	Amsterdam .	1887	1888	..	..	..	3 *4·7-in.*, 1 *2·9-in.*, 2 *1·4-in.*	..	11·7	75	82
cr. . .	Friesland . . .	3838	294	48½	17¾	10,000 Y.	Rotterdam .	1896	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 smaller.	4	19·8 *t*	400	306
,, . .	Gelderland. . .	3969	310¾	48½	17¾	10,000 Y.	Feijenoord .	1898	1900	..	2¼	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 4 *1·4-in.*, 4 M.	4	20·0	850	312
,, . .	Holland . . .	3838	294	48½	17¾	10,000 Y.	Amsterdam .	1896	1898	285,700	2	..	2 *5·9-in.*, 6 *4·7-in.*, 4 *2·9-in.*, 8 *1·4-in.*, 4 M.	4	19·6 *t*	400	306
g. v. . .	Java (I) . . shd.	1279	205¼	31¼	14	1050	Rotterdam .	1885	1887	..	..	..	1 *5·9-in.*, 3 *4·7-in.*, 1 *2·9-in.*, 2 *1·4-in.*	..	12·5 *t*	160	114
cr. . .	Koningin Emma der Nederlanden shd.	3472	301	41	21¼	2730	Amsterdam .	1879	1882	..	..	..	6 *6·6-in.* *6-ton*, 8 *4·7-in.* (K.), 2 *2·9-in.*, 8 *3-pr.*, 8 M.	..	14·0	470	301
g. v. . .	Lombok (I) . . shd.	591	172	27¼	11	990	Amsterdam .	1891	1892	..	..	..	3 *4·7-in.*, 1 *2·9-in.*, 2 *3-pr.*	..	12·0	55	87
,, . .	Mataram (I) . .	797	166	30¾	11¾	1100	Amsterdam .	1896	1897	..	..	..	3 *4·7-in.*, 2 *3-in.*, 2 *1·4-in.*	..	13·0	113	95
,, . .	Nias (I) . . .	797	166	30¾	11¾	1227	Amsterdam (Huygens)	1895	1896	..	..	..	3 *4·7-in.*, 2 *2·9-in.*, 4 *1·4-in.*	..	13·0	120	95

NETHERLANDS.—Cruising Ships—*continued.*

((I) denotes vessels of the Dutch Indian Navy.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	inches.	inches.			knots.	tons.	
cr. . . .	Noord-Brabant .	3969	299	48½	17¾	10,000 Y.	Flushing .	1899	1901	..	2¼	..	2 5·9-*in.*, 6 4·7-*in.*, 4 2·9-*in.*, 4 1·4-*in.*, 4 M.	4	20·0	850	312
cr. . . .	Pelikaan (I) . shd.	394	131¼	24	8¾	485	Rotterdam .	1891	1892	..	..	..	3 4·7-*in.*, 1 3-*in.*, 2 3-*pr.* do.	..	11·35 *t*	43	40
cr. . . .	Serdang (I) . .	797	166	30¾	11¾	1100	Flushing .	1897	1898	..	..	..	3 4·7-*in.*, 2 2·9-*in.*, 4 1·4-*in.*	..	13·0	113	95
sl. . . .	Sommelsdijk . shd.	997	178½	31	14	700	Amsterdam .	1881	1882	..	..	..	1 5·9-*in.*, 3 4·7-*in.* (K.), 1 2·9-*in.*	..	10·0	150	88
cr. . . .	Sumatra (I) . .	693	229½	37	14	3750	Amsterdam .	1890	1892	..	1½	..	1 8·2-*in.*, 1 5·9-*in*, 2 4·7-*in.*, 1 2·9-*in.*, 4 3-*pr.*, 2 M.	..	17·0	225	183
g.v. . . .	Sumbawa (I) .	591	174½	26½	11¼	930	Flushing .	1891	1892	..	..	..	3 4·7-*in.*, 1 2·9-*in.*, 2 3-*pr.*	..	12·5 *t*	60	87
cr. . . .	Utrecht . . .	3969	310¾	48½	17¾	10,000 Y.	Amsterdam .	1898	1900	..	2¼	..	2 5·9-*in.*, 6 4·7-*in.*, 4 2·9-*in.*, 4 1·4-*in.*, 4 M.	4	20·0	850	312
cr. . . .	Van Speyk . shd.	3669	302	41	23	2891	Amsterdam .	1880	1881	..	..	..	6 6·6-*in.* 6-*ton*, 8 4·7-*in.* (K.), 2 2·9-*in.*, 6 3-*pr.* 2 M.	..	14·0	360	301
cr. . . .	Zeeland . . .	3838	294	48½	17¾	10,589 Y. *t*	Flushing .	1897	1898	285,700	2	..	2 5·9-*in.* 6 4·7-*in.*, 4 2·9-*in.*, 8 1·4-*in.*, 4 M.	4	19·4 *t*	400	306
g.v. . . .	Zwaluw (I) . shd.	332	126	20	10	240	Flushing .	1882	1883	..	..	..	2 3-*in.*, 2 2-*in.*	..	10·0	26	40

Gun-vessels of the Indian Navy: Arend, Flamingo, Raaf, Reiger, Valk, Zeeduif, and Zwaan (400 tons), launched between 1880 and 1891; Glatik (417 tons), 1894; Argus and Cycloop (438 tons), 1893.

Sixteen Gunboats (*Staunch class*) of 268 tons, and of 100 to 171 H.P.; also *five small gunboats* of 210 tons, and 124 to 174 H.P., and *one steel gunboat* of 108 tons and 172 I.H.P. The new programme contemplates the building of three unarmoured monitors, 14 gunboats and three schooners.

Bellona (920 tons), gunnery training ship: Makasser (850 tons), surveying vessel.

NORWAY.—Armoured Ships.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			in.	in.			knots.	tons.	
c.d. s.t.	Eidsvold . New Ship .	3847	290	50½	16½	4500 Y.	Elswick	1900 Bldg.	1901 ..	..	6 H.N.S.	2	..	..	6 H.N.S.	6 H.N.S.	2 *8·2-in.*, 6 *5·9-in.*, 8 *12-pr.*, 6 *3-pr.*	2 sub.	16·5 *t*	400/600	261
,,	Norge .	3847	290	50½	16½	4500 Y.	Elswick	1900	1901	..	6 H.S.	2	..	..	6 H.S.	6 H.S.	2 *8·2-in.*, 6 *5·9-in.*, 8 *12-pr.*, 6 *3-pr.*	2 sub.	16·5 *t*	250/400	248
,,	Harald Haarfagre .	3556	280	48½	16½	3700	Elswick	1896	1898	190,000	7 H.S.	2	..	..	8 H.S.	..	2 *8-in.*, 6 *4·7-in.*, 6 *1½-pr.*, 6 *1½-pr.*	2 sub.	17·2 *t*	200/500	248
,,	Torkenskjold							1897	1899												

Also the old monitors Mjölner, Skorpionen, Thor and Thrudvang.

Cruising Ships.

Class.	NAME	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.b.	Ægger .	387	108½	29½	8	450	Horten	1892	1893	..	1½	..	1 *8·2-in.*, 1 *2·7-in.* 2 *1·9-in.*	..	9·0	..	43
g.v.	Ellida .	984	187	32¾	14¼	900	Horten	1880	1881	..	..	..	5 *5·9-in. 4-ton* (K.), 1 *4·7-in.*, 1 l., 2 M.	1	12·0	97	128
,,	Frithjof .	1349	216½	32¾	13¼	300	Horten	1896	1898	..	..	..	2 *4·7-in.*, 4 *2·9-in.* 4 *1·4-in.*, 2 l.	3 1 sub.	15·0	120	156
,,	Heimdal .	620	167¼	26¾	11¾	700	Christiania	1892	1893	..	..	..	4 *2·5-in.*	..	12·0	92	62
,,	Sleipner .	571	173¾	26	9½	800	Horten	1877	1878	..	..	..	1 *10·2-in. 22-ton* (K.), 1 *5·9-in. 4-ton* do., 1 M.	1	12·0	80	87
to g.b.	Valkyrien.	374	190	24¼	9¼	3300	Elbing.	1896	1897	..	..	..	2 *2·7-in.* 1 M.	2	23·2 *t*	90	57
g.v.	Viking .	1095	203½	30½	13	2000	Horten	1891	1892	..	1½	..	2 *5·9-in.* (A.), 4 *2·5-in.*, 4 *1·4-in.*, 2 M.	3	15·0	140	156

Eleven Gunboats, of 189 to 280 tons, and of 180 to 450 I.H.P., armed with one large gun and machine guns in each.
Sixteen smaller Gunboats, of 60 tons, 70 I.H.P., and 7½ knots speed; each armed with one 5½-inch gun. Also several smaller gunboats.
A first-class gunboat, No. 4, of 395 tons, in hand. A despatch vessel, 850 tons, laid down in 1902.

PORTUGAL.—Armoured Ship.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date o Launch	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots	tons.	
b.	Vasco da Gama .	2972	233	40	18¾	6000 W.T.	Blackwall . Leghorn	1876 1903	1878	132,000	9¾-4	3	6 K.S.	..	7¾ K.S.	..	2 *8-in.*, 4 *4·7-in.*, 2 *2·5-in.*, 2 *1-pr.*, 4 M.	2 (sub.)	15·5 *t*	300	218

The Vasco da Gama has been reconstructed by Messrs. Orlando at Leghorn; she has been lengthened 23 ft., rearmed and reboilered.

Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr. . .	Adamastor .	1962	250	35	14	4000	Leghorn .	1896	1897	..	3	5	2 *5·9-in.*, 4 *4·7-in.*, 4 *2·2-in.*, 4 M.	3	18·0 *t*	270	232
corv. . .	Affonso de Albuquerque	1111	203	33	13½	1360	Blackwall .	1884	1885	56,500	..	..	2 *6-in.* (A.), 5 *4·7-in.*, 2 *2·5-in.*, 2 M.	..	13·3 *t*	140	183
g.v. . .	Bengo . .	462	125½	24½	9	400	Birkenhead .	1879	1879	22,500	..	..	1 *6-in.*, 2 *3·4-in.*	..	10·0	80	88
„ . .	Diu . . .	717	147	27½	13	700	Lisbon .	1889	1891	..	..	..	1 *5·9-in.* (K.), 2 *4·7-in.*, 1 *3-pr.*, 2 M.	..	12·0	80	114
cr. . .	Dom Carlos I. .	4100	360	46½	17½	12,500 Y.	Elswick .	1898	1899	..	4	..	4 *5·9-in.* (A.), 8 *4·7-in.*, 12 *3-pr.*, 6 *1-pr.*, 4 M.	5 (3 sub.)	22·0	1000	260
g.v. . .	Dom Luiz I .	710	151	27¼	13¾	512	Lisbon .	1895	1896	..	..	..	4 *4·1-in.*, 3 *2·5-in.*, 3 M.	..	9·9	100	..
„ . .	Liberal . .	580	140	25½	10½	580	Birkenhead .	1884	1886	32,500	..	..	1 *6-in. 4-ton* (A.), 3 *4-in.*, 2 M.	..	11·0	90	109
„ . .	Mandovi . .	462	125½	24½	9	400	Birkenhead .	1879	1880	22,500	..	..	1 *5·9-in.*, 2 *3·4-in.*, 2 M. .	..	10·0	80	86
„ . .	Patria . .	620	196¾	27½	8½	1800	Lisbon .	1903	..	..	..	..	4 *4-in.*, 6 *1·8-in.* .	..	15·0	..	..
cr. . .	Rainha Amelia	1640	246	36	14¾	5000 Nor.	Lisbon .	1899	1901	..	1	..	4 *5·9-in.*, 2 *3·9-in.*, 2 *3-pr.*, 4 M.	2	20·6 *t*	..	250
„ . .	São Gabriel / São Rafael	1772	246	35½	14¼*	4000 N.S.	Havre .	1898	1899	..	1½	..	2 *5·9-in.* (*Canet*), 4 *4·7-in.*, 8 *1·8-in.*, 2 M.	1	17·5 *t*	500	200
g.b. . .	São Salvador .	710	151	27¼	13¾	..	Lisbon .	Bldg.	..	..	..	..	4 *4·1-in.*, 3 *5·2-in.*, 3 M.	..	11·0	100	..
to.g.b.	Tejo . . .	522	229½	23	..	7000	Lisbon .	1901	1902	..	..	..	1 *3-in.*, 6 *1·8-in.* . .	3	25·0	..	85
„ . .	Vouga . .	718	160¾	27½	12	600	Lisbon .	1882	1883	..	..	..	4 *4-in.*, 2 *1·8-in.*, 2 M. .	..	10·0	100	109
„ . .	Zaire . . .	580	140	25½	10½	580	Birkenhead .	1884	1885	32,500	..	..	1 *6-in.* (A.), 3 *4-in.*, 2 M. .	..	11·0	90	109
„ . .	Zambeze . .	627	143	25¾	12	500	Lisbon .	1886	1887	..	..	..	1 *6-in.* (A.), 2 *4-in.*, 2 M.	..	10·0	85	107

* Mean draught.

Fifteen small gunboats and about 29 light-draught steel *river-gunboats*. *Two gunboats* of 220 tons, the Al. Baptista de Andrade and Thomaz Andrea for Mozambique and Timor.

RUSSIA.—Armoured Ships.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkheads.	Gun Position. Heavy Guns.	Gun Position. Secondary.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s., t.	Adm. Chichagoff	3505	254	42½	18	2060	St. Petersburg	1868	1870	..	..	..	..	..	6	..	2 11-in., 4 4-pr., 6 Q.F., 4 l.	..	10·5 t	300	264
,,	Adm. Greig *	3462	254	42½	17½	2031	St. Petersburg	1868	1870	..	4½	..	..	..	6	..	3 11-in., 6 Q.F., 2 l.	..	10·0	300	280
,,	Adm. Lazareff	3462	254	43	17½	2004	St. Petersburg	1867	1869	..	4½	..	..	..	6	..	3 11-in., 6 Q.F., 4 l.	..	10·25 t	300	280
a.c.	Adm. Nakhimoff shd.	8524	333	61	25	9000 B.	St. Petersburg	1885 1900	1888	572,000	10–6 comp.	3	..	..	8 comp.	..	8 8-in., 10 6-in., 10 Q.F., 4 3-pr., 6 M.	4	16·7 t	1200	567
c.d.s.	Adm. Oushakoff	4126	265	52½	17	5000	St. Petersburg	1893	1895	410,000	10	3	..	..	7–8	..	4 9-in., 4 6-in., 6 1·8-in., 8 M.	4	16·0	400	318
,,	Adm. Seniavin							1894	1895												
c.d.s., t.	Adm. Spiridoff	3505	254½	42½	19	2007	St. Petersburg	1868	1870	..	6	..	..	..	6	..	2 11-in., 4 4-pr., 6 Q.F., 4 l.	..	10·5	300	260
b.	Alexander II shd.	9927	326	67	23	8000	St. Petersburg	1887	1890	..	14–6 comp.	2½	..	6 comp.	10 comp.	6 comp.	2 12-in., 4 9-in., 8 6-in., 4 6-pr., 4 3-pr., 6 M.	5	16·5 t	1200	604
,,	Alexander III (Imperator)	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1901	..	..	9–4 K.S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 12-in., 12 6-in., 20 3-in., 20 3-pr., 6 1-pr.	6 2 sub.	18·0	1250/2000	740
,,	Andrei Pervozvannui	16,630	429¾	79¾	28½	18,000 B.	St. Petersburg (Galerny)	Bldg.	..	1,170,000	..	..	..	..	..	..	4 11·8-in., 12 7·9-in.	..	18·0	..	..
a.c.	Bayan	7726	443	55¾	22	17,400 t B.	La Seyne	1900	1902	..	8–3 K.S.	2	3 K.S.	..	7 K.S.	3 K.S.	2 8-in., 8 6-in., 20 2·9-in., 7 1·8-in.	5 2 sub.	22 t	750/1100	..
b.	Borodino	13,600	367½	76	26	16,000 B.	St. Petersburg (New Admiralty)	1901	..	..	9–4 K.S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 12-in., 12 6-in., 20 3-in., 20 3-pr., 6 1-pr.	6 2 sub.	18·0	1250/2000	740
,,	Catherine II., B.S.	10,180	331	69	26½	10,600 B.	Nicolaieff	1886	1889	900,000	18–10 comp.	3	14 comp.	..	14 comp.	..	6 12-in., 7 6-in., 8 6-pr., 6 M.	7	15·5 t	886	325
b.	Cesarevitch §	12,912	388¾	76½	26	16,300 B.	La Seyne	1901	1902	..	9¾–4 K.S.	2½	6 K.S.	9 K.S.	10–11 K.S.	6¾ K.S.	4 12-in., 12 6-in., 20 3-in., 20 1·8-in., 6 1·4-in., 4 M., 2 l.	6 2 sub.	19·6 t	900/1850	732
a.c.	Dmitri Donskoi shd.	5882	296½	52	24¼	7000	St. Petersburg	1883	1885	..	6	2½	..	10	10	..	6 6-in., 10 4·7-in., 16 Q.F. and M., 4 l.	4	16·5	400	510
t.	Dvenadzat Apostoloff (Twelve Apostles), B.S.	8076	330	60	25½	11,500	Nicolaieff	1890	1892	..	14–6 comp.	2½	10 comp.	12 comp.	12 comp.	5 comp.	4 12-in., 4 6-in., 8 3-pr., 10 M.	6	16·6 t	800	500
,,	Evstafi, B.S.	12,480	372½	72¾	27	10,600 B.	Nicolaieff	Pro.		..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	10 K.S.	5 K.S.	4 12-in., 16 6-in., 14 3-in., 6 1·8-in., 14 1·4-in., 6 M., 2 l.	..	..	..	..
a.c.	General Admiral shd.	4722	285½	49¼	21	4472	St. Petersburg	1873	1875	..	6	..	..	..	..	..	6 8-in., 2 6-in., 10 Q.F. and M., 5 l.	4	14·2 t	1000	312
c.d.s.	General Admiral Apraxine	4200	277½	52½	17½	5757 t	St. Petersburg (New Admiralty)	1896	1898	..	10 H.S.	3	..	..	7·8 K.S.	..	3 10-in., 4 6-in., 6 1·8-in., 8 1·4-in.	4	15·0 t	215	318
a.c.	Gertzog Edinburgski	5050	285½	49¼	21	5222	St. Petersburg	1875	1877	..	6	..	..	..	6	..	4 8-in., 5 6-in., 12 Q.F., 6 l.	2	15·2 t	1000	500
b.	Georgi Pobiedonosetz (George the Victorious), B.S.	10,280	320	69	26½	10,600 13,468 t	Sebastopol	1892	1896	†431,000	16–11	..	12	..	12	..	6 12-in., 7 6-in., 8 3·9-in., 6 M.	7	16·5 t	700	500
a.g.b.	Gremiastchy	1500	225	41	11	2500 B.	St. Petersburg	1892	1893	..	5	1½	..	3½	..	..	1 9-in., 1 6-in., 10 Q.F.	2	15·0	100	142
a.c.	Gromoboi shd.	12,336	473	68½	26	14,500	St. Petersburg (Baltic)	1899	1900	..	6 H.S.	3	4¾ H.S.	6 H.S.	6 H.S.	4¾ H.S.	4 8-in., 16 6-in., 6 4·7-in., 20 3-in., 36 small Q.F. and M.	5 4 sub.	20·0	2500	814
a.g.b.	Grozjastchy	1492	229	41¾	11	2000 B.	St. Petersburg	1890	1891	..	5	1½	..	3½	..	..	1 9-in., 1 6-in., 8 Q.F.	2	15·0	100	120
b.	Ioann Zlatoust, B.S.	12,480	372¼	72¾	27	10,600 B.	Sebastopol	Pro.	..	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 12-in., 16 6-in., 14 3-in., 6 1·8-in., 14 1·4-in., 6 M., 2 l.	5 sub.	17·0	670‡	636
,,	Khrabry	1492	229	41¾	11	3000 Nic.	St. Petersburg (New Admiralty)	1895	1896	..	5	1½	..	3½	..	..	1 9-in., 1 6-in., 8 Q.F.	2	15·0	100	120
t.	Kniaz Potemkine Tavritchesky, B.S.	12,480	372¼	72¾	27	10,600 B.	Nicolaieff	1900	1902	..	9–3 K.S.	2½	6 K.S.	7–5 K.S.	12–10 K.S.	5 K.S.	4 12-in., 16 6-in., 14 3-in., 6 1·8-in., 14 1·4-in., 6 M., 2 l.	5 sub.	17·0	670‡	636

* To be fitted with new boilers. † Exclusive of armament. ‡ And liquid fuel, 580 tons. § Torpedoed at Port Arthur, Feb. 9, 1904.

RUSSIA.—Armoured Ships—*continued.*

(B.S., Black Sea Fleet.)

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second ary.	Armament. Guns. B.L.R. are of Russian Krupp pattern.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
b.	Kniaz Souvaroff.	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1902	..	..	9–4 K.S.	4	6 K.S.	10 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	6 2 sub.	18·0	1250 / 2000	740
t	Navarin .	10,206	338	67	25	9000	St. Petersburg	1891	1895	772,995	16 *comp.*	3	12 *comp.*	12 *comp.*	12 *comp.*	5 *comp.*	4 *12-in.*, 8 *6-in.*, 14 Q.F., 4 l.	6	16·0	1200	630
,,	Nicolai I. . shd.	9672	326	67	23	8000 B.	St. Petersburg	1888 1900	1892	453,000§	14–6 *comp.*	2½	..	..	10 *comp.*	6 *comp.*	2 *12-in.*, 4 *9-in.*, 8 *6-in.*, 12 Q.F., 8 M., 4 l.	6	14·8 *t*	..	604
b.	Orel . .	13,600	367½	76	26	16,000 B.	St. Petersburg (Galerny)	1902	..	..	9–4 K.S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	4 (2 sub.)	18·0	1250 / 2000	740
t.	Oslabya .	12,674	401¼	71½	26	14,500	St. Petersburg (New Admiralty)	1898	1901	..	9½ H.S.	2¾	6 H.S.	9 H.S.	9 H.S.	6 H.S.	4 *10-in.*, 11 *6-in.*, 16 *3-in.*, 10 *1·8-in.*, 17 *1·4-in.*, 2 l.	6	18·0	1063 / 2056	732
a.g.b.	Otvazny .	1500	225	41	11	2000 2589 *t* B.	St. Petersburg	1892	1894	..	5	1½	..	3½	..	..	1 *9-in.*, 1 *6-in.*, 10 Q.F.	2	15·5 *t*	100	142
a.c.	Pamyat Azova* . shd.	6675	377	51	23	8000	St. Petersburg	1888	1890	350,000	9 *comp.*	2½	..	8 *comp.*	8 *comp.*	..	2 *8-in.*, 13 *6-in.*, 14 Q.F., and 3 M.	7	18·8 *t*	1000	525
b.	Pavel I (Imperator)	16,630	429¾	79¾	28½	18,000 B.	St. Petersburg (Baltic)	Bldg.	..	1,170,000	..	..	..	..	..	..	4 *11·8-in.*, 12 *7·9-in.*	..	18·0	..	..
t.	Peresviet .	12,674	401¼	71¾	26	14,500	St. Petersburg. (Baltic)	1898	1901	..	9–7 H.S.	2¾	6 H.S.	9 H.S.	9 H.S.	6 H.S.	4 *10-in.*, 11 *6-in.*, 16 *3-in.*, 10 *1·8-in.*, 17 *1·4-in.*, 2 l.	6	18·0	1063 / 2056	732
,,	Peter Veliky .	9891	328¼	62¼	23¾	8258	St. Petersburg	1872	1875	..	14–8	3	8	..	8	..	4 *12-in.*, 4 *8·4-in.*, 13 Q.F., 4 l.	1	14·5 *t*	1200	436
,,	Petropavlovsk ¶ .	11,354	367½	69	26	14,213 *t*	St. Petersburg	1894	1898	1,098,000	15¾	3½	4	9	10 H.S.	6	4 *12-in.*, 12 *5·9-in.*, 34 smaller.	6	16·3 *t*	900	700

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
t.	Poltava. .	10,960	367½	69	26	11,255 *t*	St. Petersburg	1894	1898	1,098,000	15¾	3½	4	9	10 H.S.	6	4 *12-in.*, 12 *5·9-in.*, 34 smaller.	6	16·2 *t*	900	700
b.	Pobieda (Victory) .	12,674	401¼	71½	26	14,500 B.	St. Petersburg (Baltic)	1900	1901	..	9½–4 H.S.	2¾	9 H.S.	9 H.S.	9 H.S.	6 H.S.	4 *10-in.*, 11 *6-in.*, 16 *3-in.*, 10 *1·8-in.*, 17 *1·4-in.*, 2 l.	6	18·0	1063 / 2056	732
,,	Retvizan ‖ .	12,700	374	72¼	25	16,000 Nic.	Philadelphia	1900	1902	..	9–4 K. S.	4	6–2 K.S.	9 K.S.	10 K. S.	5 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	..	18·0	1016 / 2000	..
a. c.	Rossia . . shd.	12,130	480	68½	26	14,500 B.	St. Petersburg	1896	1898	..	10–5 H.S.	2½	4 H.S.	6 H.S.	2 H.S.	2 H.S.	4 *8-in.*, 16 *6-in.*, 12 *3-in.*, 36 small Q.F. & M.	5	20·0	2500 ‡	725
t.	Rostislav, B.S. .	8880	341	66½	24	8500	Nicolaieff	1896	1899	..	15¾–8 H.S.	2–3	5 H.S.	5 H.S.	15¾ H.S.	6 H.S.	4 *10-in.*, 8 *5·9-in.* (Canet), 12 *1·8-in.*, 4 *1·5-in.*, 2 M.	2–3	16·0	‡550 / 800	624
a. c.	Rurik . . shd.	10,923	396½	67	26	13,250	St. Petersburg	1894	1895	..	10–5 *comp.*	2½	..	10 H S.	..	2 H S.	4 *8-in.*, 16 *6-in.*, 6 *4·7-in.*, 18 small Q.F. & M.	5	18·7 *t*	2000	768
t.	Sevastopol .	10,960	367½	69	26	13,600	St. Petersburg	1895	1899	1,098,000	15¾	3½	..	9	10 H.S.	6	4 *12-in.*, 12 *5·9-in.*, 34 smaller.	6	17·5 *t*	900	700
b.	Sinope, B.S.† .	10,180	331	69	26½	13,000 B.	Sebastopol	1887	1890	900,000	16–11 *comp.*	3	14 *comp.*	12	14 *comp.*	..	6 *12-in.*, 7 *6-in.*, 8 Q.F., 6 M.	7	16·75	886	325
t.	Sissoi Veliky (Sissoi the Great) .	10,400	341	66½	24	8500	St. Petersburg	1894	1897	796,333	15¾ H S.	3	5 H.S.	5 H.S.	14 H.S.	5 H.S.	4 *12-in.*, 6 *6-in.*, 12 *1·8-in.*, 4 *1·4-in.*, 2 M.	6	16·0	550	590
b.	Slava . . .	13,516	367½	76	26	16,000 B.	St. Petersburg (Baltic)	1903	..	..	9–4 K. S.	4	6 K.S.	9 K.S.	10 K.S.	6 K.S.	4 *12-in.*, 12 *6-in.*, 20 *3-in.*, 20 *3-pr.*, 6 *1-pr.*	4 (2 sub.)	18·0	1250 / 2000	740
,,	Tchesmé, B.S. .	10,930	331	69	26½	11,000	Sebastopol	1886	1888	900,000	16 *comp.*	3	14 *comp.*	..	14 *comp.*	..	6 *12-in.*, 7 *6-in.*, 8 Q.F., 6 M.	7	15·0	886	325
,,	Tria Sviatitelia, B.S. .	12,480	357½	72¼	27	10,600	Nicolaieff	1893	..	..	16 H.S.	3	16 H.S.	12 H.S.	16 H.S.	5 H.S.	4 *12-in.*, 8 *6-in.*, 4 *4-in.*, 4 *7-in.*, 56 smaller Q.F. & M.	6 (2 sub.)	18·0 *t*	1000	582
cir.	Vladimir Monomach . shd.	6061	296½	52	24	7000	St. Petersburg	1882	1885	..	10–6 *comp.*	2	..	..	..	..	5 *8-in.*, 12 *6-in.*, 18 Q.F. & M., 4 l.	2	15·2 *t*	400	550

* To receive Belleville boilers and be reconstructed. † To receive new boilers and undergo machinery repairs. ‡ And liquid fuel. § Exclusive of armament. ‖ Torpedoed at Port Arthur, Feb. 9, 1904. ¶ Sunk at Port Arthur.

RUSSIA.—Cruising Ships, &c.

(B.S., Black Sea Fleet.)

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
to.g.b.	Abrek	535	212¼	24¾	9	4506 t	Abo	1896	1897	53,600	½	..	2 3-in., 4 1·8-in.	2	21·2 t	..	..
2nd cl. cr.	Admiral Korniloff	5800	351	48½	20	9000	St. Nazaire	1887 1895	1889	296,000	2½	..	2 8-in., 14 6-in., 6 1·8-in., 6 1·4-in., 5 l.	6	17·5 t	1100	425
cr.	Afrika	2590	285½	39¼	17	1350	Chester, U.S.	1877	1879	..	..	..	3 6-in., 6 Q.F., 4 M., 4 l.	..	13·0	975	257
"	Almaz	3285	325	43½	17½	7,500 B.	St. Petersburg (Baltic)	1903	1903	..	2¾	5–3½ K.S.	6 4·7-in., 8 1·8-in., 2 1·4-in., 3 M.†	6	19·0	560	340
"	Asia	2500	269	36	16½	1100	Philadelphia	1878	1880	..	..	..	2 6-in., 5 Q.F., 6 M., 5 l.	..	13·0	750	260
"	Askold	5905	426½	49¼	20¾	24,000 T.S.	Kiel (Germania)	1900	1901	..	3	4	12 6-in., 12 3-in., 8 1·8-in., 2 1·4-in., 2 M.	6 (2 sub.)	23·8 t	720 / 1100	500
"	Aurora	6630	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1900	1902	..	2½	..	8 6-in., 20 3-in., 8 1·4-in.	4	20·0	900 / 1400	422
to.g.b.	Bakan (Mining) shd.	840	180½	15½	11½	3800 B.	St. Petersburg (Baltic)	1896	1897	..	..	..	4 Q.F.	..	12·0	..	..
g.v.	Bobr	950	187	35¼	9½	1150	Kretona	1884	1885	43,000	..	..	1 9-in., 1 6-in., 5 Q.F., M., & 6 l.	..	12·0	..	..
cr.	Bogatyr	6645	416¾	54½	20¾	20,300 Nor.	Stettin (Vulcan)	1900	1902	..	2	5 N.S.	12 6-in., 12 3-in., 6 1·8-in., 2 1·4-in., 2 M.	6 (2 sub.)	24·0 t	720 / 1100	580
"	Boyarin	3200	347¾	41½	16¼	18,000 B.	Copenhagen	1900	1902	..	2	..	6 4·7-in., 8 1·8-in., 2 1·4-in., 3 M.	6 (1 sub.)	25·0	600	334
to.g.b.	Captain Sacken, B.S.	742	210	24	8¾	3400	Nicolaieff	1888	1889	40,700	..	..	7 4·7-in., 7 M.	6	18·5 t	97	120
g.v.	Chernomoretz, B.S.	1224	210	35	11	1500 B.	Nicolaieff	1889	1891	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5 t	250	161
"	Coreetz	1213	206	35	10½	1500	Stockholm	1886	1887	..	1½	..	2 8-in., 1 6-in., 2 Q.F., 4 l.	2	13·5 t	..	..
cr.	Diana	6630	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1899	1902	..	2½	..	6 6-in., 20 3-in., 8 1·4-in.	4	20·0	900 / 1400	422
corv.	Djigit	1456	206¾	32¾	16	1700	St. Petersburg	1876	1877	..	..	..	3 6-in., 8 Q.F. & M., & 4 l.	..	13·0	250	172
"	Donetz, B.S.	1224	210	35	11	1500 B.	Nicolaieff	1887	1888	40,000	..	..	2 8-in., 1 6-in., 7 Q.F. & M.	2	13·5 t	250	161
to.g.b.	Gaidamak	400	192½	24¼	7½	3000	Abo	1893	1894	..	..	..	2 1·8-in., 7 1·4-in., 10 M.	3	22·0	90	87
g.v.	Gilyak	963	200	37	9¼	1000 B.	St. Petersburg (New Admiralty)	1897	1898	..	..	2	1 4·7-in., 5 3-in., 2 2·6-in., 4 1·8-in.	1	12·0	..	150
to.g.b.	Griden, B.S.	400	192½	24¼	7½	3500	Nicolaieff	1893	1894	66,600	..	..	2 1·8-in., 7 1·4-in., 10 M.	3	22·0	90	60
cr. / "	Izumrud / Jemtchug	3080	347¾	41½	16	17,000 Y.	St. Petersburg (Nevsky)	1903	..	..	2	..	6 4·7-in., 6 1·8-in., 2 1·4-in., 1 M.	5	24·0	600	340
"	Kagul, B.S.	6675	439	54½	20½	19,500	Nicolaieff	1903	..	..	2¾	5–3½ K.S.	12 6-in., 12 3-in., 6 1·8-in.	5 (2 sub.)	23·0	720	..
to.g.b.	Kazarsky, B.S.	400	190	24	8½	3500	Elbing	1890	1891	32,500	..	..	9 1·8-in. (Hotchkiss)	2	23·0	90	60
g.b.	Khivinetz	1316	230	36	10½	1400 B.	St. Petersburg (New Admiralty)	Bldg.	..	..	..	..	2 4·7-in., 8 2·9-in., 4 M.	..	13·0	..	200
corv.	Kreisser	1653	206¾	32¾	16	1800	St. Petersburg	1875	1876	..	..	..	2 6-in., 7 Q.F., 1 M., 4 l.	..	13·0	..	..
g.v.	Kubanetz, B.S.	1224	210	35	11	1500 B.	Sebastopol	1888	1889	40,000	..	..	2 8-in., 1 6-in., 7 Q.F.	2	13·8 t	250	161
to.g.b.	Lieutenant Ilyin	714	230	24	8¾	3500	St. Petersburg	1887	1888	40,150	..	..	7 3-pr., 10 M.	7	20·1 t	97	120
g.v.	Mandjur	1416	210	35	11	1400	Copenhagen	1886	1887	..	1½	..	2 8-in., 1 6-in., 7 Q.F., M., & 4 l.	2	14·0	160	179
corv.	Nayezdnik	1334	206¾	32¾	14	1719	St. Petersburg	1878	1879	..	..	..	3 6-in., 7 Q.F. & M., 4 l.	..	13·0	250	172
cr.	Novik	3080	347¾	41½	16	18,000 T.S.	Danzig (Schichau)	1900	1902	..	2	..	6 4·7-in., 8 1·8-in., 2 1·4-in., 3 M.	6	25·0	600	340
"	Oleg	6675	439¾	54½	20½	19,500 Nor.	St. Petersburg (New Admiralty)	1903	..	..	2¾	5–3½	12 6-in., 12 3-in., 6 1·8-in.	2 sub.	23·0	600	340
corv.	Oprichnik	1426	206¾	32¾	14	1268	St. Petersburg	1880	1881	..	..	..	3 6-in., 7 Q.F. & M., 4 l.	..	13·0	230	172
cr.	Otchakoff, B.S.	6670	434	54½	20½	19,500 Nor.	Sebastopol	1902	..	..	2¾	5–3½ K.S.	12 6-in., 12 3-in., 6 M.	2 sub.	23·0	720 / 1100	..
"	Pallada*	6630	413¼	55¾	21	11,610 B.	St. Petersburg (Galerny)	1899	1902	..	2½	..	6 6-in., 20 3-in., 8 1·4-in.	4	20·0	900 / 1400	422
3rd cl. cr.	Pamyat Merkuriya, B.S.	2997	295	41	17	3000	Toulon	1880	1882	..	..	..	6 6-in., 8 Q.F. & M., 4 l.	2	16·0	1100	200
sl.	Plastun	1255	206¾	32¾	14	1268	St. Petersburg	1879	1880	..	..	..	3 6-in., 7 Q.F. & M., & 4 l.	..	13·0	250	172
to.g.b.	Posadnik	400	192½	24¼	7½	3600	Elbing	1892	1892	111,000	..	..	2 1·8-in., 7 1·4-in., 3 M.	3	22·0	90	87

* Torpedoed at Port Arthur, February 9, 1904. † Armament doubtful. Almaz to be launched May, 1903.

RUSSIA.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
corv.	**Razboynik**	1329	206¾	32¾	14	1786	St. Petersburg	1878	1880	125,000	..	..	3 *6-in.*, 7 Q.F. & M., & 4 l.	..	13·0	250	172
3rd cl. *cr.*	**Rynda**	3508	265¾	46	16	3000	St. Petersburg	1885	1887	..	1½	..	10 *6-in.*, 9 Q.F., M., & 4 l.	4	14·8	710	322
g.v.	**Sivootch**	950	187	35	9½	1125	Stockholm	1884	1885	43,000	..	..	1 *9-in.*, 1 *6-in.*, 5 Q.F., M., & 6 l.	..	*t* 12·5	..	170
corv.	**Strjelok**	1343	206¾	32¾	14	1528	St. Petersburg	1880	1881	..	..	..	3 *6-in.*, 7 Q.F., M., & 4 l.	..	*t* 13·0	250	172
cr.	**Svietlana**	3828	331¼	42¾	18¾	3828 B.	Havre	1896	1897	..	2	4	6 *5·9-in.* (*Canet*), 10 *1·8-in.*	4	20·2	1000	360
g.v.	**Teretz, B.S.**	1224	210	35	11	1500 B.	Sebastopol	1888	1889	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	*t* 13·8	250	161
”	**Uraletz, B.S.**	1224	210	35	11	1500 B.	Sebastopol	1888	1890	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	*t* 13·8	250	161
cr.	**Varyag***	6500	420	52	20¾	20,000 Nic.	Philadelphia	1899	1900	..	3	..	12 *6-in.*, 12 *3-in.*, 6 *1·4* (*Hotchkiss*).	6 (2 sub.)	*t* 23·0	770	571
”	**Vitiaz**	6375	414	52½	20¾	20,000 B.	St. Petersburg (Galerny)	Bldg.	..	..	2¾	5–3½ K.S.	12 *6-in.*, 12 *3-in.*, 8 *1·8-in.*	5 (2 sub.)	23·0	1250 720	..
sl.	**Vjestnik**	1255	206¾	32¾	14¼	1268	St. Petersburg	1879	1880	..	..	..	3 *6-in.*, 7 Q.F. & M., & 4 l.	..	13·0	250	172
to.g.b.	**Voevoda**	400	192½	24¼	7½	3600	Elbing	1892	1902	111,000	..	..	2 *1·8-in.*, 7 *1·4-in.*, 3 M.	3	22·0	90	87
”	**Vzadnik**	400	192½	24¼	7½	3000	Abo	1893	1894	..	..	..	4 *1·8-in.*, 7 *1·4-in.*, 10 M., & 1.	3	22·0	90	97
sl.	**Zabiyaka**	1234	219¾	29½	14¾	1194	Philadelphia	1878	1879	..	..	..	6 Q.F., 4 M., 5. l.	..	14·5	250	172
g.v.	**Zaporojetz**	1224	210	35	10	1500	Nicolaieff	1887	1889	40,000	..	..	2 *8-in.*, 1 *6-in.*, 7 Q.F. & M.	2	*t* 13·5	250	161
cr.	Two unnamed† (Oleg cl)	6670	..	..	..	17,000 Y.	St. Petersburg (Nevsky)	Bldg.	..	..	..	..	..	..	*t* 20·0	..	..
”	One unnamed† (Novik cl)	3200	..	..	..	..	Black Sea	Bldg.	..	..	..	..	..	..	..	..	..

Baltic:—*Ten Gunboats* (*Staunch Class*), of 270 to 402 tons, 195 to 445 I.H.P., with 1 11-inch breech-loader, and 9 knots speed, and *two Gunboats* of about 180 tons and 7 knots speed. *Training Ships*, Bajan, Voin, Vierny, and Moriak. Ermach, very powerful ice-breaker. Black Sea:—*Twelve Steamers* (*Gun-vessels*, *Despatch-vessels*, *&c.*), 90 to 298 tons. *Imperial Yachts*, Standart, Polarnaia Svezda, Tsarevna, &c.; Alexandra, building at the Baltic Yard. Okean, *coal transport*, 12,000 tons, 18 knots, launched at Kiel, 1901. She will carry 4000 tons of coal, and steam 10,000 miles, with 800 tons as her own supply, at reduced speed; fitted with Thornycroft, Schulz, Yarrow, Belleville and Niclausse boilers for instructional purposes. *Kamtschatka*, troopship, launched at the new Admiralty Yard, St. Petersburg, Nov. 1, 1902.

The Torpedo Transport *Volga* is in hand at St. Petersburg (New Admiralty). Mining Vessel *Yenesei* (sister of *Amur*) sunk accidentally by fouling a mine at Dalny, Feb. 11, 1904.

The *Lena* (ex *Kherson*), 10,225 tons, and *Angara* (ex *Moskva*) are transport vessels of 19 or 20 knots taken over from the Volunteer Fleet and renamed.

* Sunk in action at Chemulpo with the gunboat *Korietts*, Feb. 9, 1904. † It is stated that a special committee has reported against the further construction of vessels of these classes, larger displacements being advocated.

Auxiliary Steamers.

Class.	NAME.	Material of Hull.	Displacement.	Length.		Beam.		Draught.		Propellers.	Indicated Horse-Power.	Where Built.	Date of Launch.	Speed.
			tons.	ft.	in.	ft.	in.	ft.	in.					
	BLACK SEA CO.													
Auxiliary Cruiser	Czar	S.	2340	319	0	37	0	23	6	1	350 nom.	Newcastle	1883	14
"	Czarevna	"	2340	319	0	37	0	23	6	1	350 nom.	"	1883	14
"	Czaritza	"	2340	319	0	37	0	23	6	1	350 nom.	"	1883	14
"	Grand Duke Alexis	"	2350	284	0	37	0	14	9	1	3500	Hebburn	1890	16
"	Grand Duke Constantine	"	2400	284	0	37	0	15	0	1	3500	"	1891	16
"	Grand Duke No. 1	"	2400	288	0	37	0	15	0	1	2500	"	Bldg.	14½
"	Grand Duke No. 2	"	2400	288	0	37	0	15	0	1	2500	"	"	14½
"	Emperor Nicolas II.	"	..	..		..		..		..	..	"	1895	..
"	Roumantzeff	"	760	212	0	28	0	7	6	2	1000	"	1894	13
	VOLUNTEER FLEET.													
"	Ekaterinoslav *	"	10,500	440	0	49	6	24	0	2	3200	"	1896	12
"	Kazan	"	9755	400	0	49	3	24	0	1	4000	"	1900	12
"	Kiev	"	10,500	440	0	49	6	24	0	2	3200	Clydebank	1895	13
"	Kostroma	I.	7975	360	0	42	0	23	6	1	2700	Hebburn	1888	14
"	Nijni Novgorod	"	7876	325	0	40	0	23	6	1	2000	Elswick	1891	11½
"	Orel	"	7990	445	0	48	0	23	6	2	10,000	Hebburn	1889	19
"	Petersburg	"	9252	460	0	52	0	24	0	2	11,000	"	1894	19
"	Poltava	S.	10,225	493	0	54	3	24	0	2	12,500	Dumbarton	Bldg.	19½
"	Saratoff	"	8556	462	0	50	0	24	0	2	10,000	Glasgow	1892	19
"	Smolensk	"	11,850 B.	506	6	58	0	24	0	2	16,500 B.	Newcastle (Hawthorn)	1901	20
"	Tamboff	"	8640	385	0	45	0	24	6	1	2,500	Dumbarton	1893	12¾
"	Vladimir	"	10,500	440	0	49	6	24	0	2	3,200	"	1895	12
"	Voronej	"	10,500	440	0	49	6	24	0	2	3,200	"	1895	12
"	Yaroslav	"	8640	385	0	45	0	24	6	1	2,500	"	1893	12¾

It is stated that ten of the most recent of the Volunteer steamers are to be withdrawn from the Service and added as cruisers to the Naval Reserve.

* Captured by the Japanese, February, 1904.

SPAIN.—Armoured Ships.

Class	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour.						Armament.		Speed.	Coal.	Complement.
											Belt.	Deck.	Side above Belt.	Bulkhead.	Gun Position.		Guns.	Torpedo Tubes.			
															Heavy Guns.	Second-ary.					
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
a.c.	Cardenal Cisneros	6889	347¾	60¼	25	15,000	Ferrol .	. 1897	1902	600,000	12–8	2	..	8	8	2¾	2 *11-in.*, 8 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5	20·7 t	1200	
"	Cataluña .	. 6889	347¾	61	21¾	15,000	Cartagena	. 1900	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5 sub.	20·0	1200	484
"	Emperador Carlos V	9089	380	67	25	18,500	Cadiz (Vea Murguia)	1895	1898	734,000	2	6½–2	2	..	10	2	2 *11-in.* (Hontoria), 8 *5·5-in.*, 4 *3·9-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 6 M.	6	20·0	1200	535
br.	Numancia	. 7190	314¾	55¾	25¼	3708	La Seyne	. 1863 1897	1865	315,600	5½	..	4¾	..	5	4¾	4 *8-in.*, 4 *6·2-in.*, 10 *5·9-in.*	2	8·0	1100	600
b.	Pelayo .	. 9744	330	66	25	9000 Nic.	La Seyne	. 1887 1897	1890	..	17¾	4	..	..	19¼	4 H.S.	2 *12·5-in.*, 2 *11-in.*, 9 *5·5-in.*, 6 smaller, 12 M.	7	16·0	800	600
a.c.	Princesa de Asturias	6889	347¾	61	21¾	15,000	Carraca	. 1896	..	600,000	12–10	2	..	12	10½	..	2 *11-in.*, 10 *5·5-in.*, 2 *2·7-in.*, 4 *2·2-in.*, 4 *1·4-in.*, 2 M.	5	20·0	1200	500
br.	Vitoria (training)	7250	318¼	55¾	25¼	4500	Blackwall	. 1865	1867	..	5½–3	..	5½	..	5	5	4 *8-in.*, 4 *6·4-in.*, 10 *5·9-in.*, 4 *1·8-in.*, 2 l., 6 M.	2	11·0	875	561

SPAIN.—Cruising Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.				knots.	tons.	
cr.	Alfonso XII	3041	278¾	42½	16½	4800	Ferrol	1887	1890	..	..	..	6 *6·2-in.* (Hontoria), 2 *2·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	17·5 *t*	600	300
„	Aragon*	3271	246	46	21	4400	Cartagena	1879	1882	..	..	..	6 *6·2-in.* (Hontoria), 2 *3·6-in.* (K.), 4 *2·9-in.*, 2 M.	2	14·0	470	300
g.b.	General Concha	515	157½	25½	8½	600	Ferrol	1883	1884	..	..	..	3 *4·7-in.* (Hontoria), 2 Q.F., 1 M.	1	11·0	80	93
cr.	Conde de Venadito	1112	210	32	12½	1600	Cartagena	1888	1890	..	..	..	4 *4·7-in.* (Hontoria), 2 *2·7-in.*, 2 Q.F., 5 M.	2	14·0	220	130
to.g.b.	Don Alvaro de Bazán	810	233	26¾	22	2500	Ferrol	1897	1899	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
„	Doña María de Molina	810	233	26¾	22	2500	Ferrol	1896	1898								
„	Destructor	458	192½	25	7	3800	Clydebank	1887	1888	..	..	..	1 *3·5-in.*, 4 *6-pr.*, 4 M.	3	22·56 *t*	104	55
cr.	Extremadura	2030	290	36	14	7000 T	Cadiz	1900	1902	..	2	..	8 *4-in.* (Vickers), 4 *2·2-in.*, 2 *1·4-in.*, 1 l.	..	20·0	..	..
to.g.b.	Filipinas	738	213	27	8½	4600	Cadiz	1892	1893	..	..	..	2 *4·7-in.*, 4 *1·5-in.*, 4 M.	4 sub.	20·0	120	110
„	Galicia	561	190	23	10½	2600	Ferrol	1891	1892	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	19·0	106	80

SPAIN.—Cruising Ships—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	ins.	ins.			knots.	tons.	
g. v.	General Lezo	515	157½	25½	8½	600	Cartagena	1885	1886	..	..	..	2 *4·7-in.* (Hontoria), 1 *3·5-in.*, 2 Q.F., 1 M.	2	11·0	80	97
sl.	Infanta Isabel	1112	211	32¼	12½	1500	Cadiz	1885	1887	..	..	..	4 *4·7-in.* (Hontoria), 2 *2·7-in.*, 3 Q.F., 4 M.	2	14·0	220	130
”	Isabel II	1112	211	32¼	12½	1500	Ferrol	1886	1888								
cr.	Lepanto	4750	318½	50½	20	12,000	Cartagena	1892	1895	..	4¾	..	4 *7·8-in.* (Hontoria), 6 *4·7-in.*, 6 *6-pr.*, 4 *3-pr.*, 5 M.	5	20·0	1100	276
gv.	Magallanes	515	157½	25½	8½	600	Cadiz	1885	1887	..	..	..	3 *4·7-in.* (Hontoria), 3 M.	1	11·0	80	97
to.g.b.	Marqués de la Victoria	810	233	26¾	22	2500	Ferrol	1897	1900	..	..	..	2 *4·7-in.* (Hontoria), 4 *1·6-in.*, 2 M.	4	19·0	..	110
cr.	Marqués de la Enseñada	1014	185	30	11½	1600	Carraca	1890	1893	..	2½	..	4 *4·7-in.* (Hontoria), 5 Q.F., 4 M.	4	15·0	160	164
g.v.	Marqués de Molíns	562	190	23	10¼	2600	Ferrol	1891	1893	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80
”	Martin Alonso Pinzón	562	190	23	10¼	2600	Ferrol	1892	1893								
cr.	Navarra	3286	233	42½	20¼	4400 Nic.	Ferrol	1881	1883	..	..	..	4 *5·9-in.*, 2 *4·7-in.*, 2 *3·4-in.*, 4 *2·9-in.*, 4 M.	2	14·0	470	300
g.v.	Nueva España	620	190	23	11¾	2600	Carraca	1889	1890	..	..	..	2 *4·7-in.* (Hontoria), 4 *2 2-in.*	2	14·0	106	91
”	Rapido	561	190	23	10¼	2600	Carraca	1891	1893	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	14·0	106	80
cr.	Reina Regente	5287	337	529	19¾	6500 W.T.	Ferrol	Bldg.	..	..	..	3	10 *5·5-in.*, 12 *2·2-in.*, 2 l., 8 M.	3	20·0	..	..
”	Rio de la Plata† shd.	1773	246	35¼	15	7100 N.S.	Havre	1898	1899	..	..	1	2 *5·5-in.*, 4 *3·9-in.*, 4 *2·2-in.*, 6 M.	2	20·0	270	213
g.v.	Temerario	561	190	23	10¼	2600	..	1889	1890	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	15·0	106	82
”	Vincente Yáñez Pinzón	562	190	23	10¼	2600	Ferrol	1891	1892	..	..	..	2 *4·7-in.* (Hontoria), 4 *2·2-in.*, 1 M.	2	12·0	106	80

Fernando el Catolico, 500 tons, torpedo training ship. Hernán Cortés, Vasco Nuñez de Balboa, Ponce de Léon, MacMahon, gunboats.

† A sister vessel, the General Linares, is stated to be in hand.

SWEDEN.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
c.d.s.,t.	Aeran . .	3612	287	49¼	16½	6500 Y.	Gothenburg	1901	1902	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	17·2 *t*	370	250
„	Dristigheten .	3445	285	48½	16	5400 Y.	Gothenburg	1900	1901	..	8 K.S.	1⅞	..	..	8 N.S.	3¾ K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 M.	2 sub.	16·5	300	..
a.c.	Fylgia . .	4527	377¼	48¾	16	12,000 Y.	Stockholm .	Bldg.	..	350,000	4 K.	2	..	..	4 K.	..	8 *5·9-in.*, 14 *2·2-in.* . .	2	21·5	350 / 900	..
c.d.s.,t.	Göta* . .	3238	258½	48	16¾	4750	Gothenburg	1890 1902	1891	..	11¾–8	2	..	..	7½ H.S.	5 H.S.	2 *10-in.*, 4 *6-in.*, 5 *2·2-in.*, 8 M.	3	16·0	240	150
„	Manligheten .	3612	287	49¼	16½	6000 Y.	Malmö .	1904	..	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250
„	Njord . .	3445	278¼	48½	17½	5350	Gothenburg	1898	1899	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	Oden . . .	3445	278¼	48½	17½	5330	Stockholm .	1896	1898	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 *9·8-in.*, 4 *4·7-in.*, 10 *2·2 in.*, 4 M.	1	16·5	275	200
„	Oskar II . .	4203	..	..	..	8500 Y.	..	Bldg.	..	..	..	..	..	..	..	..	2 *8·2-in.*, 8 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	..	18·0	..	..
„	Svea* . .	3051	248½	49¼	17	3640	Gothenburg	1886	1887	..	11¾–8	2	..	..	11½	..	2 *10-in.* (A.), 4 *4·7-in.*, 6 *2·2-in.*, 8 M.	1	14·7 *t*	220	268
„	Tapperheten .	3612	287½	49¼	16½	6000 Y.	Malmö .	1901	..	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250
„	Thor . . .	3445	278¼	48½	17½	5350	Stockholm .	1898	1890	..	9½ H.N.S.	1⅞	..	..	9⅞ H.N.S.	3¾ H.N.S.	2 *9·8-in.*, 6 *4·7-in.*, 10 *2·2-in.*, 4 M.	1	16·5	275	200
„	Thule* . .	3248	260¾	48	16¾	4740	Stockholm .	1892	1894	..	11¾–8	1⅞	..	..	11½	..	2 *10-in.* (A.), 4 *6-in.*, 5 *2·2-in.*, 8 M.	2	16·2 *t*	250	165
„	Wasa . .	3612	287	49¼	16½	6000 Y.	Stockholm .	1901	1893	..	7 K.S.	1⅞	..	..	7½ K.S.	5 K.S.	2 *8·2-in.*, 6 *5·9-in.*, 10 *2·2-in.*, 2 *1·4-in.*, 2 M.	2 sub.	16·5	370	250

The old coast-defence ships John Ericsson, Thordön, and Tirfing, 1500 tons, Lake, 1600 tons, and the armoured gunboats Berserk, Björn, Folke, Gerda, Hildur, Sölve and Ulf, 460 tons. Some of these are being partially modernized.

* Reconstructed or in course of reconstruction.

SWEDEN.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.										knots.	tons.	
to.g.b.	Claes Horn	787	222	27	10¼	3600	Stockholm	1899	1900	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	20·0	..	100
"	Claes Uggla	787	232	27¼	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	20·5	..	100
tor. ship.	Drott (ex Ran)	539	175½	26	9¾	960	Stockholm	1877	1878	..	..	..	4 Engström Q.F.	1	13·0	100	..
g.v.	Edda	549	183¾	27	10¼	960	Carlskrona	1885	1886	..	..	..	1 *10·6-in.*, 1 *6-in.*, 2 *1·5-in.*, 2 M.	..	13·6 *t*	80	76
corv.	Freja	1968	216	40	19¾	1750	Malmö	1885	1887	..	..	..	4 *6-in.*, 8 *4·7-in.*, 4 *1·5-in.*, 2 *2·5-in.*, 5 M.	..	14·1 *t*	180	250
to.g.b.	Jacob Bagge	787	222	27	10¼	3970	Malmö	1898	1899	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	19·5	..	100
"	Örnen					4100	Gothenburg	1896	1897						19·5		
"	Psilander	787	232	27¼	8¾	4500 Y.	Stockholm	1900	1901	..	..	..	2 *4·7-in.*, 4 *2·2-in.*	1 sub.	20·5 *t*	..	100
g.v.	Rota	527	171¼	25¼	10¾	780	Stockholm	1878	1879	..	..	..	1 *10·6-in.*, 1 *4·7-in.*, 2 M.	..	13·0	80	72
"	Skäggald	527	171¼	26	9¾	780	Stockholm	1879	1880	..	..	..	1 *10·6-in.*, 1 *4·7-in.*, 2 M.	..	13·2 *t*	80	72
"	Skagul	527	171½	25½	10¼	780	Stockholm	1878	1879	..	..	..	1 *6-in*, 1 *4·7-in.*, 2 *2·2-in.*, 2 M.	..	13·1 *t*	80	72
"	Skuld	527	171¼	25¼	10¾	780	Carlskrona	1879	1880	..	..	..	1 *10·6-in.*, 1 *4·7-in.*, 2 M.	..	13·0	80	72
"	Urd	527	172¼	25½	10½	780	Malmö	1877	1878	..	..	..	1 *6-in.*, 1 *4·7-in.*, 2 *2·2-in.*, 2 M.	..	13·5 *t*	80	71
"	Verdande	527	171½	25½	10¼	780	Carlskrona	1879	1880	..	..	..	1 *10·6-in.*, 1 *4·7-in.*, 2 M.	..	13·2 *t*	80	72

Old gun vessel of 500 tons, four gunboats of 190 to 200 tons, and about 130 I.H.P. each, and carrying 1 5-in. B.L.R. and 2 M.; also one vessel of 280 tons and 440 H.P., armed with 4 Q.F. guns—the Svenskund, used as a mining and torpedo-ship and ice-breaker.

TURKEY.—Armoured Ships.

A number of ships have been struck out of these lists owing to information obtained from Constantinople. Of the remainder few have any fighting value.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Secondary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal	Complement.
		tons.	ft.	ft.	ft.						in.	in.	in.	in.	in.	in.			knots.	tons.	
c.	Assar-i-Shefket	2047	203½	42½	16½	1750	La Seyne	1868	1870	..	6	..	..	..	5	..	1 *9-in.* (A.), 4 *7-in.*, 4 M., 4 l.	..	11·0	375	220
c.b.	Assar-i-Tewfik *	4613	272¼	52½	25	3560	La Seyne	1868	1870	..	8	..	..	..	6	..	2 *9·2-in.*, 6 *6-in.*, 10 *12-pr.*, 12 *6-pr.*	..	13·0	400	..
c.	Avni-Illah	2400	226¼	36	16½	2200	Thames	1869	1871	..	6	1½	..	..	6	..	4 *9-in.* M.L.R. (A.), 4 M., 4 l.	1	12·0	220	225
b.	Azizieh †	6400	292	55¾	25½	3735	Clyde	1864	1865	..	5½	..	5	..	4½	5	2 *9·2-in.* (K.), 8 *8·2-in.*, 6 *3·9-in.*, 7 M., 2 l.	2	13·0	750	600
c.b.	Feth-i-Bulend	2720	236¼	39¼	18	3250	Thames	1869	1870	..	9	5	..	..	9	..	4 *9-in.* M.L.R. (A.), 4 M., 4 l.	1	13·0	300	250
a.g.b.	Feth-el-Islam	335	101¾	24½	6	290	Gironde	1864	1866	..	3	..	..	..	3	..	2 *7-in.* (A.), 2 l.	..	8·0	20	..
c.b.	Hamidieh	6700	292	55¾	24¾	4500	Turkey	1885	1893	..	9	3	5	..	5	..	10 *10·2-in.* (K.), 2 *6·6-in.*, 6 l., 2 M.	2	13·0	600	..
b.	Mahmoudieh †	6400	292	55¾	25½	3735	Thames	1864	1866	..	5½	..	5	..	4½	5	2 *9·2-in.* (K.), 8 *8·2-in.*, 6 *3·9-in.*, 7 M., 2 l.	2	12·0	750	600
c.b.	Messoudieh*	9120	331½	59	25¾	11,000 Nic.	Thames Genoa	1874 1901	1876	..	12	1	12	..	6–9	12	2 *9·2-in.*, 12 *6-in.*, 14 *3-in.*, 10 *6-pr.*, 2 *3-pr.*, 2 l.	..	17·5 t	600	..
"	Muin-i-Zaffer	2400	230	36	16½	2200	Thames	1869	1870	..	6	1½	..	..	6	..	4 *10-in.* M.L.R. (A.), 1 *4·7-in.* (K.), 4 M., 4 l.	1	12·0	220	..
"	Mukadim-i-Hair	2720	236¼	39¼	18	3000	Turkey	1872	1874	..	9	5	..	..	9	..	4 *10-in.* M.L.R. (A.), 1 *4·7-in.* (K.), 4 M., 4 l.	1	12·0	300	250
"	Nedjim-i-Schefket.	2018	203½	42½	16½	1900	La Seyne	1868	1870	..	6	..	..	..	5	..	1 *9-in.*, 4 *7-in.* (A.), 4 M., 4 l.	1	11·0	300	220
b.	Orkanieh †	6400	292	55¾	25½	3735	Clyde	1865	1870	..	5½	..	5	..	4½	5	2 *9·2-in.* (K.), 8 *8·2-in.*, 6 *3·9-in.*, 7 M., 2 l.	2	12·0	750	600
"	Osmanieh †	6400	292	55¾	25½	3735	Clyde	1864	1869	..	5½	..	5	..	4½	5	2 *9·2-in.* (K.), 8 *8·2-in.*, 6 *3·9-in.*, 7 M., 2 l.	2	12·0	750	600

* The Messoudieh has been reconstructed by Messrs. Ansaldo, receiving new armament and machinery. Nothing appears to have been decided in regard to the Assar-i-Tewfik, which was sent to Kiel.
† It is stated that these vessels are to be reconstructed on the Golden Horn by Messrs. Ansaldo.

TURKEY.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Abdul Hamid / Abdul Medjid *	3830	340	47½	16	12,500 Nic.	Elswick / Philadelphia	1903	..	..	4–1½	..	2 *6-in.*, 8 *4·7-in.*, 6 *1·8-in.*, 6 M.	2	22·0	600	..
”	Fezibahri	1815	226	35	14	2500	Turkey	Bldg.	..	..	½	..	6 *6-in.* (K.)	7	17·0	..	..
”	Heibetnuma	1960	226	37	14	2500 ind.	Turkey	1890	1893	..	..	..	3 *6·6-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	14·0	..	..
”	Hundavendikiar	4050	279	49¼	21	..	Turkey	Bldg.	..	..	2	..	2 *8·9-in.* (K.), 6 *5·9-in.*, 4 *3·9-in.*	5	..	..	300
g.v.	Lutfi-Hamayoun	1313	210	35	14	2800	Turkey	1892	1894	..	..	..	4 *6-in.* (K.), 6 *4·7-in.*, 6 Q.F.	2	13·0	..	..
to. g.b.	Namet	900	230	31	16½	4500	Gaarden	1890	1891	..	..	¼	2 *4-in.* (K.), 16 M.	2	19·0	..	111
”	Pelenk-i-deria	840	236¼	31	16½	5000	Gaarden	1890	1891	..	..	¼	2 *4-in.* (K.), 16 M.	2	20·0	..	111
g.v.	Sedul Bahr	800	173½	26½	11½	160	Turkey	1894	1897	..	2	..	4 *4·7-in.* (K.), 6 M.	2	12·7	120	..
cr.	Selimieh	4050	279	49¼	21	..	Turkey	Bldg.	..	..	½	..	2 *8·2-in.* (K.), 6 *5·9-in.*, 4 *4-in.*, 6 M.	..	..	..	300
”	Shadie	1815	226	35	14	2500	Turkey	Bldg.	..	..	..	..	6 *5·9-in.* (K.)	7	17·0	..	..
to. g.b.	Shahani-deria	450	200	23	9	3000	Turkey	1892	1894	..	..	..	2 *4·7-in.* (K.), 6 M.	4	22·0	..	..
g.v.	Zuhaf	800	173½	26½	11½	160	Turkey	1894	1896	..	..	..	4 *4·7-in.* (K.), 6 M.	2	12·7	120	..

* Or Medjidieh.

UNITED STATES.—Armoured Ships.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. *	Armour. Belt.	Armour. Deck.	Armour. Side above Belt.	Armour. Bulkhead.	Armour. Gun Position. Heavy Guns.	Armour. Gun Position. Second-ary.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t.	Alabama	11,565	368	72¼	24¾	11,366 *t*	Philadelphia	1898	1900	544,539	16½–4 H.S.	2¾–4	5¼ H.S.	12 H.S.	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	4	17·1 *t*	800 1200	686
c.d.s., *t.* (2 t.)	Amphitrite	3990	259½	55½	14¾	1600	Wilmington	1883 reblt.	1895	..	9–5 N.S.	1¾	..	..	11½ N.S.	..	4 *10-in.*, 2 *4-in.*, 2 *6-pr.*, 2 *3-pr.*, 7 *1-pr.*, 3 M., 1 l.	..	10·5	250	182
c.d.s., *t.* (1 t.)	Arkansas	3235	252	50	12½	1829 T.	Newport News	1900	1902	197,267	11–5 H.S.	1½	..	..	11 H.S.	..	2 *12-in.*, 4 *4-in.*, 3 *6-pr.*, 6 *1-pr.*, 2 M.	.	12·0 *t*	400	131
a. c.	Brooklyn	9215	400½	64¾	26¼	18,769	Philadelphia	1895	1896	613,583	3 H.S.	6–3	4 H.S.	..	8 H.S.	5½ H.S.	8 *8-in.*, 12 *5-in.*, 12 *6-pr.*, 4 *1-pr.*, 4 M., 2 l.	4	21·9 *t*	900 1461	517
a. c.	California	13,680	502	69¼	24½	23,000 B. & W.	S. Francisco	Bldg.	..	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 6 M., 2 l.	2	22·0	900 2000	822
a. c.	Charleston	9700	424	66	25½	21,000 B.&W.	Newport News	1904	..	563,030	4 H.S.	3	4 H.S.	..	4 H.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 8 *1-pr.*, 4 M.	..	22·0	650 1500	664
a. c.	Colorado	13,680	502	69¼	24½	23,000 Nic.	Philadelphia	1903	..	756,000	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 6 M., 2 l.	2	22·0	900 2000	822
t.	Connecticut	16,000	450	77	26¾	16,500 B. & W.	New York	Bldg.	..	819,300	11½ K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 6 *1-pr.*, 8 M., 2 l.	..	18·0	2200	..
c.d.s., *t.* (1 t.)	Florida	3225	252	50	12½	2400 Nor.	Elizabeth-port	1901	1903	190,075	11–5 H.S.	1½	..	..	11 H.S.	..	2 *12-in.*, 4 *4-in.*, 3 *6-pr.*, 6 *1-pr.*, 2 M.	..	12·4 *t*	400	131
Super-posed turrets.	Georgia	14,948	435	76¼	23¾ †	19,000 Nic.	Bath, Me.	Bldg.	..	737,700	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2	19·0	900 1900	695
b.	Idaho	13,000	375	77	27	10,000 W.T.	Philadelphia	Bldg.	..	616,360	9–4 K.S.	..	7 K.S.	7 K.S.	12–8 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 10 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 2 *1-pr.*, 8 M., 2 l.	2 sub.	17·0	1750	...
t.	Illinois	11,565	368	72¼	24¾	12,898	Newport News	1898	1901	533,237	16½–4 H.S.	2¾–4	5¼ H.S.	12 H.S.	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 6 *1-pr.*, 4 M., 2 l.	4	17·45 *t*	800 1200	686
b.	Indiana	10,288	348	69¼	27¼	9,738	Philadelphia	1893	1895	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10 H.S.	4 *13-in.*, 8 *8-in.*, 4 *6-in.*, 20 *6-pr.*, 4 *1-pr.*, 2 l.	2	15·5 *t*	400 1567	497
b.	Iowa	11,340	360	72¼	26¾	12,105	Philadelphia	1896	1897	618,514	14 H.S.	2¾	5 H.S.	12 H.S.	15 H.S.	8–6 H.S.	4 *12-in.*, 8 *8-in.*, 6 *4-in.*, 20 *6-pr.*, 4 *1-pr.*, 4 M., 2 l.	4	17·8 *t*	625 1795	510

* The sums given in this column are exclusive of the cost of armour and armament, according to the system of making appropriations in the estimates. † Mean draught.

UNITED STATES.—Armoured Ships—*continued.*

Class.*	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.*	Armour: Belt.	Armour: Deck.	Armour: Side above Belt.	Armour: Bulkhead.	Armour: Gun Position: Heavy Guns.	Armour: Gun Position: Secondary.	Armament: Guns.	Armament: Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.	in.	in.	in.	in.			knots.	tons.	
t.	Kansas	16,000	450	77	26¾	16,500 B. & W.	Camden, N.J.	Bldg.	..	855,850	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	..	18·0	900 / 2200	...
ram	Katahdin	2155	250¾	43½	16	5,068	Bath, Me.	1893	1896	191,102	6–3 H.S.	2–6	..	..	18 con. tr. H.S.	..	4 *6-pr.*	..	16·1 *t*	175 / 192	97
superposed turrets	Kearsarge / Kentucky	11,525	368	72¼	25¾	11,954 / 12,318	Newport News.	1898	1900	462,345 each	16½–4 H.S.	2¾–5	5½ H.S.	..	15 H.S.	9 H.S.	4 *13-in.*, 4 *8-in.*, 14 *5-in.*, 20 *6-pr.*, 8 *1-pr.*, 4 M., 2 l.	4	16·8 *t*	410 / 1591	586 / 589
t.	Louisiana	16,000	450	77	26¾	16,500 B. & W.	Newport News.	Bldg.	..	819,300	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 6 *1-pr.*, 8 M., 2 L.	..	18·0	900 / 2200	..
t.	Maine	12,500	388	72¼	25½	15,840 Nic.	Philadelphia	1901	1902	592,828	11–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *6-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	18·0	1000 / 2000	551
a.c.	Maryland	13,680	502	69½	24½	23,000 B. & W.	Newport News.	1903	..	756,400	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 6 M., 2 l.	2 sub.	22·0	900 / 1850	830
b.	Massachusetts	10,288	348	69¼	27⅓	10,415	Philadelphia	1893	1896	620,569	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 4 *6-in.*, 20 *6-pr.*, 4 *1-pr.*, 2 M.	2	16·2 *t*	400 / 1579	495
c.d.s., t. (2 t.)	Miantonomoh	3990	259½	55¼	15	1,426	Chester	1876 reblt.	1891	..	7–4 *comp.*	1¾	..	..	11½ *comp.*	..	4 *10-in.*, 2 *6-pr.*, 2 *3-pr.*, 6 *1-pr.*, 1 M., 1 l.	..	10·5	250	149
a.c.	Milwaukee	9700	424	66	25½	21,000 W.T.	S. Francisco.	Bldg.	..	580,500	4 H.N.S.	3	4 H.N.S.	..	4 H.N.S	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 8 *1-pr.*, 4 M.	..	22·0	650 / 1500	664
t.	Minnesota	16,000	450	77	26¾	16,500	Newport News	Bldg.	..	844,500	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	..	18·0	900 / 2200	..
b.	Mississippi	13,000	375	77	27	10,000 W.T.	Philadelphia	Bldg.	..	616,360	9–4 K.S.	..	7 K.S.	7 K.S.	12–8 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 10 *7-in.*, 12 *3-in.*, 6 *3-pr.*, 2 *1-pr.*, 8 M., 2 l.	2 sub.	17·0	1750	..
t.	Missouri	12,500	388	72¼	25½	16,000 T.	Newport News	1901	1903	592,828	12–4 K.S.	2¾–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *6-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	18·0	1000 / 2000	551
c.d.s., t. (2 t.)	Monadnock	3990	259½	55½	14½	2,163	Vallejo, Cal.	1883 reblt.	1896	..	5–9 H.S.	1¾	..	..	11½ H.S.	..	4 *10-in.*, 2 *4-in.*, 2 *6-pr.*, 2 *3-pr.*, 2 *1·4-in.*, 2 *1-pr.*, 2 M., 1 l.	..	12·0	250 / 386	213
c.d.s., t.	Monterey	4084	256	59	15¼	5244	S. Francisco.	1891	1893	345,731	13–6 H.S.	3	..	..	13 H.S.	..	2 *12-in.*, 2 *10-in.*, 6 *6-pr.*, 4 *1-pr.*, 2 M., 1 l.	..	13·6 *t*	200 / 233	218
Superposed turrets.	Nebraska	14,948	435	76¼	23¾ †	19,000 B. & W.	Seattle.	Bldg.	..	767,210	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	19·0	900 / 1900	695
c.d.s., t. (1 t.)	Nevada	3218	252	50	12½	2,004 Nic.	Bath, Me.	1900	1903	197,267	11–5 H.S.	1½	..	..	11 H.S.	..	2 *12-in.*, 4 *4-in.*, 3 *6-pr.*, 6 *1-pr.*, 2 M.	..	13·0 *t*	400	131
Superposed turrets.	New Jersey	14,948	435	76¼	23¾ †	19,000 B. & W.	Quincy, Mass.	1904	..	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	19·0	900 / 1900	
a.c.	New York	8200	380½	64¾	26¾	17,401	Philadelphia	1891	1893	613,377	4 H.S.	6–3	..	..	10 H.S.	5–¼4 H.S.	6 *8-in.*, 12 *4-in.*, 8 *6-pr.*, 2 *1-pr.*, 2 M.	2	21·0 *t*	750 / 1290	
t.	Ohio	12,500	388	72¼	25½	15,100 T.	S. Francisco.	1901	..	595,705	11–4 K.S.	3–4	6 K.S.	10 K.S.	12 K.S.	6 K.S.	4 *12-in.*, 16 *6-in.*, 6 *3-in.*, 8 *6-pr.*, 6 *1-pr.*, 2 M., 2 l.	2 sub.	18·0	1000 / 2000	521
b.	Oregon	10,242	348	69¼	27¼	11,111	S. Francisco.	1893	1896	653,447	18 H.S.	2¾	5 H.S.	17 H.S.	17 H.S.	10–5 H.S.	4 *13-in.*, 8 *8-in.*, 4 *6-in.*, 20 *6-pr.*, 4 *1-pr.*, 2 M., 2 l.	2	16·8 *t*	400 / 1594	494
a.c.	Pennsylvania	13,680	502	69½	24½	23,000 Nic.	Philadelphia	1903	..	799,340	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 6 M., 2 l.	2 sub.	22·0	900 / 2000	822
c.d.s., t. (2 t.)	Puritan	6060	290¼	60	18½	3,700	Chester	1882 reblt.	1896	..	14–6 H.S.	2	..	..	14 H.S.	..	4 *12-in.*, 6 *4-in.*, 6 *6-pr.*, 2 *1·4-in.*, 2 *1-pr.*, 1 l.	..	12·4 *t*	307	230
Superposed turrets.	Rhode Island	14,948	435	76¼	23¾ †	19,000 B. & W.	Quincy, Mass.	Bldg.	..	699,680	11–4 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	19·0	900 / 1900	695
a.c.	St. Louis	9700	424	66	25½	21,000 B. & W.	Philadelphia (Neafie)	Bldg.	..	563,030	4 K.S.	3	4–3	..	4 K.S.	..	14 *6-in.*, 18 *14-pr.*, 12 *3-pr.*, 8 *1-pr.*, 4 M.	..	22·0	650 / 1500	664
a.c.	South Dakota	13,680	502	69½	24½	23,000 B. & W.	S. Francisco.	Bldg.	..	770,570	6–3½ K.S.	4	5 K.S.	4 K.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 6 M., 2 l.	2 sub.	22·0	900 / 2000	822
a.c.	Tennessee	14,500	502	72¾	25	23,000 B. & W.	Philadelphia	Bldg.	..	970,630‡	6–3 K.S.	4–1½	5 K.S.	5 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 6 M., 2 l.	..	22·0	900 / 2000	845
c.d.s., t. (2 t.)	Terror	3990	259½	55½	15¼	1,600	Philadelphia	1883 reblt.	1896	737,700	7–4 N.S.	1¾	..	..	11½ N.S.	..	4 *10-in.*, 2 *6-pr.*, 2 *3-pr.*, 2 *1·4-in.*, 1 l.	..	10·5	250 / 285	443
t.	Texas	6315	301¼	64	25¼	8,610	Norfolk	1892	1895	513,716	12 N.S.	2	..	12 N.S.	12 N.S.	..	2 *12-in.*, 6 *6-in.*, 12 *6-pr.*, 10 *1-pr.*, 2 M., 1 l.	2	17·8 *t*	500 / 850	177
	Vermont	16,000	450	77	26¾	16,500 B. & W.	Quincy, Mass.	Bldg.	..	858,730	8–11 K.S.	3–4½	8 K.S.	7 K.S.	10 K.S.	7 K.S.	4 *12-in.*, 8 *8-in.*, 12 *7-in.*, 20 *14-pr.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	..	18·0	900 / 2200	..
Superposed turrets	Virginia	14,948	435	76¼	23¾ †	19,000 Nic.	Newport News	1904	..	737,700	11–8 K.S.	3	6 K.S.	6 K.S.	11 K.S.	6 K.S.	4 *12-in.*, 8 *8-in.*, 12 *6-in.*, 12 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 8 M., 2 l.	2 sub.	19·0	900 / 1900	695
a.c.	Washington	14,500	502	72¾	25	25,000 B. & W.	Camden, N.J.	Bldg.	..	970,630‡	6–3 K.S.	4–1½	5 K.S.	5 K.S.	9 K.S.	5 K.S.	4 *10-in.*, 16 *6-in.*, 22 *3-in.*, 12 *3-pr.*, 4 *1-pr.*, 6 M., 2 l.	..	..	900 / 2000	845
a.c.	West Virginia	13,680	502	69½	24½	23,000 B. & W.	Newport News	1903	..	798,310	6–3½ K.S.	4	5 K.S.	12 H.S.	6 K.S.	5 K.S.	4 *8-in.*, 14 *6-in.*, 18 *3-in.*, 12 *3-pr.*, 8 *1-pr.*, 6 M., 2 l.	2 sub.	22·0	900 / 2000	822
t.	Wisconsin	11,565	368	72¼	25½	12,609	S. Francisco.	1898	1901	549,666	16½–4 H.S.	3–4	5¼ H.S.	..	15 H.S.	6 H.S.	4 *13-in.*, 14 *6-in.*, 16 *6-pr.*, 4 *1-pr.*, 4 M., 2 l.	4	17·1 *t*	800 / 1200	531
c.d.s., t. (1 t.)	Wyoming	3218	252	50	12½	2,451 B. & W.	S. Francisco.	1900	1903	200,350	11–5	1½	..	..	11	..	2 *12-in.*, 4 *4-in.*, 3 *6-pr.*, 6 *1-pr.*, 2 M.	..	12·4 *t*	400	131

* See note on previous page. † Mean draught. ‡ Including armour, but not armament.

UNITED STATES.—Cruising Ships, &c.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. ‡	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
cr.	Albany . shd.	3769	345	43¾	20	7500	Elswick	1899	1900	247,611	3	3–1¼ shields	6 6-in., 4 5-in., 10 6-pr., 4 1-pr., 4 M., 2 l.	3	20·0	512/754	260
g.b.	Annapolis	1060	168	36	12½	1227 B.&W.	Elizabeth Pt.	1896	1897	46,789	..	..	6 4-in., 4 6-pr., 2 1-pr., 1 M.	..	13·1 t	100/225	135
cr.	Atlanta	3000	271¼	42¼	21	3500 C. & B.&W.	Chester	1884	1886	126,785	1½	..	2 8-in., 6 6-in., 6 6-pr., 4 1-pr., 2 M., 1 l.	..	15·6 t	490	278
cr.	Baltimore	4413	327½	48½	24	10,064	Philadelphia	1888	1890	272,270	4–2½	4½ shield	4 8-in., 6 6-in., 4 6-pr., 2 3-pr., 2 1-pr., 6 M., 1 l.	5	20·1 t	400/1143	386
g.v.	Bancroft	839	187½	32	13	1213	Elizabeth Pt.	1892	1893	51,371	½	..	4 4-in., 8 3-pr., 1 1-pr., 1 M.	1	14·37 t	100/136	195
g.v.	Bennington	1710	230	36	16½	3392	Chester	1890	1891	100,894	½	..	6 6-in., 2 6-pr., 2 3-pr., 2 1-pr., 2 M.	..	17·5 t	200/403	195
cr.	Boston	3035	271¼	42¼	21	4300	Chester	1884	1887	127,196	1½	..	2 8-in., 6 6-in., 2 6-pr., 2 3-pr., 2 1-pr., 2 1·8-in., 2 1·4-in., 2 M., 1 l.	..	15·6 t	495	278
g.v.	Castine	1177	204	32	14¼	2199	Bath, Me.	1892	1894	65,450	½	..	8 4-in., 4 6-pr., 2 1-pr., 1 M., 1 l.	..	16·0	125/292	151
cr.	Chattanooga shd.	3100	292	44	16¾	4500 B.&W.	Elizabeth Port	1903	..	212,325	2	..	10 5-in., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·5 t	470/700	293
cr.	Cleveland . shd.						Bath, Me.	1901	1903								
cr.	Chicago	5000	325	48¼	22½	9000 C. & B &W.	Chester	1885	1889	182,677	1½	4 shield	4 8-in., 14 5-in., 7 6-pr., 2 1-pr., 2 M., 1 l.	..	18·0	831	409
cr.	Cincinnati	3213	300	42	20¼	8,490 B.&W.	Brooklyn	1892	1894	226,055	2½	4	11 5-in., 8 6-pr, 2 1-pr., 2 M., 1 l.	2	19·0	350/468	314
cr.	Columbia	7375	412	58¼	25½	18,509	Philadelphia	1892	1894	559,950	4–2½	4 shield	1 8-in., 2 6-in., 8 4-in., 12 6-pr., 2 1-pr., 2 M., 1 l.	4	22·8 t	750/1670	477
g.v.	Concord	1710	230	36	16½	3404	Chester	1890	1891	100,894	½	..	6 6-in., 2 6-pr., 2 3-pr., 2 1·4-in., 2 M., 1 l.	..	16·8 t	200/401	194
cr.	Detroit	2089	257	37	16¾	5227	Baltimore	1891	1893	125,860	½	..	10 5-in., 6 6-pr., 2 1-pr., 2 M., 1 l.	2	18·71 t	200	256

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost. ‡	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
cr.	Denver shd.	3100	292	44	16¾	4500 B. & W.	Philadelphia	1902	1904	212,325	2	..	10 5-in., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·5	470/700	293
cr.	Des Moines shd.						Quincy, Mass.										
g.v.	Dolphin	1486	240	32	17	2255	Chester	1884	1885	64,728	..	..	2 4-in., 2 14-pr., 2 6-pr., 2 3-pr., 2 M.	..	15·5 t	173	117
g.v.	Don Juan de Austria*	1159	210	32	13	1500	Cartagena	1889	1892	..	..	..	4 5-in., 4 6-pr., 4 M.†	3	14.0	210	130
g.v.	Dubuque	1000	174	35	13	1000 B. & W.	Morris Heights, N.Y.	Bldg.	..	..	..	..	6 4-in., 4 6-pr., 2 1-pr., 2 M.	..	12·0	200	..
cr.	Galveston . shd.	3100	292	44	16¾	4500 B. & W.	Richmond, Va.	1903	..	212,325	2	..	10 5-in., 8 6-pr., 2 1-pr., 4 M., 1 l.	..	16·5	470/700	293
g.v.	Helena	1392	250¾	40	10	1988	Newport News	1896	1897	57,536	½	2½	8 4-in., 4 6-pr., 4 1-pr., 2 M., 1 l.	..	15·5 t	100/300	256
g.v.	Isla de Cuba *	1125	192	30	12¼	800	Elswick	1887	1888	..	2½	..	4 4-in., 4 6-pr., 4 M.†	3	14·0	160	160
g.v.	Isla de Luzon *																
g.v.	Machias	1177	204	32	14¼	1873 Nor.	Bath, Me.	1891	1893	65,450	½	..	8 4-in., 4 6-pr., 2 1-pr., 1 M., 1 l.	..	15·46 t	125/292	151
cr.	Marblehead	2089	257	37	16¾	5450	Boston	1892	1894	138,498	½	..	10 5-in., 6 6-pr., 2 1-pr., 2 M., 1 l.	2	18·9 t	200/340	248
g.b.	Marietta	1000	174	34	13½	1054 B.&W.	S. Francisco.	1896	1897	45,823	..	..	6 4-in., 4 6-pr., 2 1-pr., 1 M., 1 l.	..	13·2 t	100/239	140
cr.	Minneapolis	7375	412	58¼	25½	20,862	Philadelphia	1893	1894	552,754	4–2½	4 shield	1 8-in., 2 6-in., 8 4-in., 12 6-pr., 2 1-pr., 2 M., 1 l.	4	23·0 t	750/1200	477
cr.	Montgomery	2089	257	37	17	5584	Baltimore	1891	1894	125,860	½	..	10 5-in., 6 6-pr., 2 1-pr., 2 M., 1 l.	2	18·8 t	200/340	257
g.v.	Nashville	1719	220	38	12	2536 C. & Y.	Newport News	1895	1897	57,536	½	..	8 4-in., 4 6-pr., 2 1-pr., 2 M., 1 l.	1	16·7 t	150/400	176
cr.	Newark	4098	311½	49¼	22½	8868	Philadelphia	1890	1891	256,437	3–2	2 shield	12 6-in., 8 6-pr., 4 1-pr., 2 M., 1 l.	..	19·0	400/809	384
g.b.	Newport	1000	168	36	13	1009	Bath, Me.	1896	1897	..	..	..	6 4-in., 4 6-pr., 2 1-pr., 1 M.	..	12·2 t	100/230	147
cr.	New Orleans shd.	3769	346	43¾	19¾	7500	Elswick	1896	1898	293,684	..	3–1¼ shields	6 6-in., 4 5-in., 10 6-pr., 4 3-pr., 4 M., 2 l.	..	20·0	700/800	
g.b.	Newport	1000	168	36	12¼	1009	Bath, Me.	1896	1897	47,406	..	..	6 4-in., 4 6-pr. 2 1-pr., 1 M.	..	12·3 t	100/239	135
cr.	Olympia	5870	340	53	24¾	17,313	S. Francisco.	1892	1895	369,054	4½	4–2½	4 8-in., 10 5-in., 14 6-pr., 7 1-pr., 2 M., 1 l.	6	21·69 t	400/1169	450

* Captured at Manila after the battle of May 1, 1898. The following gunboats were captured during the war with Spain, or subsequently purchased: Albay, Alvarado, Arayat, Barcelo, Basco, Belusan, Calamaines, Callao, El Cano, Guardoqui, Leyte, Manileño, Mariveles, Mindoro, Pampanga, Panay, Paragua, Quiros, Samar, Sandoval, Urdañeta, Villalobos; also General Alavá, transport, 1390 tons.
† New armament of the captured cruisers.
‡ Prices exclusive of armament.

UNITED STATES.—Cruising Ships, &c.—*continued.*

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Date of Completion.	Cost.	Armour. Deck.	Armour. Gun Position.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Normal Coal Supply.	Complement.
		tons.	ft.	ft.	ft.					£	in.	in.			knots.	tons.	
g.v.	Paducah	1000	174	35	13	1000 B.&W.	Morris Heights, N.Y.	Bldg.	..	..	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 2 M.	..	12·0	200	..
g.v.	Petrel	892	176¼	31	13½	1045	Baltimore	1888	1889	50,755	..	..	4 *6-in.*, 2 *3-pr.*, 2 *1-pr.*, 2 *1·4-in.*, 2 M.	..	11·8 *t*	100 / 200	122
cr.	Philadelphia	4410	327½	48½	23½	8815	Philadelphia	1889	1890	277,405	..	4–2½ Shields	12 *6-in.*, 4 *6-pr.*, 4 *1-pr.*, 2 M., 1 l.	..	19·68 *t*	400 / 1085	384
g.b.	Princeton	1000	168	36	12½	923	Camden	1897	1898	47,262	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·0	100 / 238	135
cr.	Raleigh	3213	300	42	20¼	8500 B.&W.	Norfolk	1892	1894	226,055	2½	4	11 *5-in.*, 8 *6-pr.*, 4 *1-pr.*, 2 M., 1 l.	2	9·0	350 / 460	313
cr.	San Francisco	4098	310	49¼	22¼	10,604	S. Francisco.	1889	1891	293,435	3–2	2 Shields	12 *6-in.*, 4 *6-pr.*, 4 *3-pr.*, 2 *1-pr.*, 6 M., 1 l.	4	19·5	350 / 628	383
cr.	Tacoma . shd.	3100	292	44	16¾	4500 B.&W.	S. Francisco.	1903	1904	212,325	..	2 Shields	10 *5-in.*, 8 *6-pr.*, 2 *1-pr.*, 4 M., 1 l.	..	16·6 *t*	470 / 700	293
g.v.	Topeka	2372	250	35	..	2200	Kiel	1881	1882	..	..	..	6 *4-in.*, 6 *3-pr.*, 2 *1-pr.*, 1 M.	..	16·0	273 / 410	167
cr.	Vesuvius (Dynamite Gunboat)	929	252¼	26½	11¼	4295	Philadelphia	1888	1890	71,963	..	..	3 *15-in.* dynamite guns, 3 *3-pr.*, 2 M.	..	21·4 *t*	152	69
g.v.	Vicksburg	1000	168	36	12½	1118	Bath, Me.	1896	1898	47,406	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M.	..	12·7 *t*	100 / 239	135
g.v.	Wheeling	1000	174	34	12½	1080	S. Francisco.	1897	1897	65,540	..	..	6 *4-in.*, 4 *6-pr.*, 2 *1-pr.*, 1 M., 1 l.	..	12·9 *t*	120 / 226	140
g.v.	Wilmington	1719	250¾	40	10	1894	Newport News	1895	1897	57,536	1	2¼	8 *4-in.*, 4 *6-pr.*, 4 *1-pr.*, 4 M., 1 l.	..	15·0 *t*	100 / 300	175
g.v.	Yorktown	1710	230	36	16⅓	3392	Philadelphia	1888	1889	93,496	..	..	6 *6-in.*, 2 *6-pr.*, 2 *3-pr.*, 4 *1-pr.*, 2 M., 1 l.	2	16·1 *t*	200 / 380	195

Also the sailing training ship Chesapeake (1175 tons), built at Bath, Me., and launched 1899. The steel training ships Cumberland and Intrepid and the wooden brig Boxer are to be built.

Enrolled Auxiliary Cruisers of the United States Navy.

Class.	NAME.	Gross Tonnage.	Length.	Beam.	Depth.	Indicated Horse-Power.	Where Built.	When Built.	Owners.	Armament, all Q.F.	Speed.
			ft.	ft.	ft.						
1st	St. Louis	11,629	535½	63	26¾	18,000	Philadelphia	1895	International Navigation Co.	8 5·5-in., 4 6-pr., 4 M.	22·2
1st	St. Paul	11,629	535½	63	26¾	18,000	"	1895	"	8 5·5-in., 4 6-pr., 4 M.	22·5
1st	Paris.	10,794	517	63¼	22	20,000	Clydebank, Scotland	1889	"	12 5·5-in., 6 6-pr., 6 M.	20·7
1st	New York	10,802	517	63¼	22	20,000	"	1888	"	12 5·5-in., 6 6-pr., 6 M.	20·6

Converted Merchant Vessels Retained.

Class.	NAME.	Displacement.	Length.	Beam.	Draught.	Indicated Horse-Power.	Where Built.	Date of Launch.	Cost.	Armament. Guns.	Armament. Torpedo Tubes.	Speed.	Coal.	Complement.
		tons.	ft.	ft.	ft.				£			knots.	tons.	
cr.	Buffalo	6888	380½	48	22	3600	Newport News	1893	117,949	2 5-in., 4 4-in., 6 6-pr., 2 M.	..	14·5	100	297
cr.	Dixie	6145	389¼	48	19¾	1294	Newport News	1893	117,949	10 6-in., 6 6-pr., 2 M.	..	16·0	1371	181
cr.	Panther	4260	310	40	18¼	..	Philadelphia	1889	77,055	6 5-in., 2 4-in., 6 3-pr., 1 M., 1 1.	..	13·0	475	198
cr.	Prairie	6872	390½	46¾	22	3800	Philadelphia	1890	117,949	10 6-in., 6 6-pr., 2 M.	..	14·5	1000	295
cr.	Yankee	6888	380½	48	22	3800	Newport News	1892	117,949	10 5-in., 6 6-pr., 2 M.	..	14·5	1000	282
cr.	Mayflower (yacht)	2690	275	36	17¼	4600	Clydebank	1896	88,359	2 5-in., 12 6-pr., 2 M.	..	16.8	584	160

There are also 22 other converted yachts, varying in displacement from 82 tons to 975 tons.
Many other vessels are on the auxiliary list, but are of low speed.

SHIPS BELONGING TO POWERS WHOSE NAVIES ARE OF LESSER IMPORTANCE.

Belgium.—Several steam vessels, between 419 and 684 tons, principally employed as packets, under the orders of the Government. The Ville d'Anvers, 414 tons, for fishery protection.

Bulgaria.—Eleven steamers of small size, of which one is used as the Prince's yacht. Two armoured gunboats for the Danube completing at Leghorn. Other ships are to be laid down. The Nadiezda, a despatch vessel (715 tons) of the French Casabianca type, launched at Bordeaux in 1898; speed, 18·85 knots; 2600 I.H.P.; Lagrafel-d'Allest boilers; armament, 2 3·9-in., 3 1·8-in. Q.F., and 2 torpedo tubes.

Colombia.—The cruiser Almirante Lezo (*ex* El Baschir), of 1200 tons displacement; 2500 H.P.; speed, 18 knots; built in 1892, bought from Morocco, 1902. Two gunboats, Namuna and Atalanta, have also been bought. Two river gunboats, General Nerino and Esperanza, 400 tons.

Ecuador.—Two old (1886) French despatch vessels, Papin and Inconstant (891 tons), built of wood and iron, have been bought. One torpedo boat and two steam transport vessels.

Egypt.—The Nile stern-wheel gunboats Sultan, Sheikh and Melik, 140 tons, Fateh and Naseh, 128 tons; also the Abu Klea, Hafir, Metemmeh, and Tamai. Some steam vessels on the coast.

Hayti.—Steel gunboat—Capois la Mort, 260 tons, 1 3·9-in., and 4 1-pr. Q.F. Iron corvette—Dessalines, 1200 tons, armed with 1 3·9-in. Q.F., 2 3·9-in. B.L., 2 l., 2 M. Two sloops—St. Michael and 1804. Gun vessel, 22nd of December.

Mexico.—The Zaragoza, built of steel, 1200 tons, 1300 H.P., 15 knots speed, and armed with 4 4·7-in. guns and 4 small quick-firing guns. Two gun vessels—Democrata and Mexico, of 450 tons and 11 knots speed, armed with 2 6½-in. muzzle-loaders and 2 small guns. Two small gunboats of 10 knots speed. Five torpedo boats. Two gun-vessels, Tampico and El Cruz, launched at Elizabethport, New Jersey, September, 1902, displacement, 980 tons; armament, 4 4-in. Q.F., 6 6-pr.; bow torpedo tube; 2400 I.H.P.; speed, 16 knots; fitted to serve as transport for 200 troops.

Persia.—Despatch vessel—the Persepolis—of 1200 tons and 10 knots speed. She is armed with 5 small breech-loading guns.

Peru.—Eclaireur, cruiser, 1769 tons, launched 1877, and partially reconstructed. Bought from France. Lima, built 1881, of 1700 tons displacement, 1800 I.H.P., 16 knots speed; armament, 2 6-in. B.L.R. guns. Screw steamer, Santa Rosa, of about 400 tons.

Roumania.—Elizabeta, protected cruiser (deck 3 in.), built in 1887 at Elswick; 230 ft. long, 32 ft. 10 in. beam; 1320 tons; 3000 I.H.P.; armament, 4 5·9-in. B.L.R., 4 Q.F., 2 M., 4 torpedo tubes. Composite gunboat Mircea, 360 tons; Grivitza, 110 tons. Two gunboats of 45 tons, and 3 first-class torpedo boats, these forming the sea division. For the Danube, the gunboats Fulgurul, Oltul, Siretul, Bistritza, 90 to 100 tons, the *torpilleur de barrage* Alexandru cel Bun (104 tons), 5 sloops, 2 small torpedo boats, and the paddle steamer Romania, 240 tons, repaired 1890. The shipbuilding programme contemplates the building of 8 monitors of 500 tons, 12 torpedo-boats and 8 vedettes for the Danube, and 6 coast-defence vessels of 3500 tons, 4 destroyers of 300 tons, and 12 torpedo-boats for the Black Sea.

Santo Domingo.—The Independencia, built in England 1894, 170 ft. long, 25 ft. broad, displacement 322 tons, and armed with seven Hotchkiss quick-firing guns. Restauracion, steel gun-vessel, 1000 tons, launched at Glasgow in 1896. The 14-knot cruiser Presidente has been reconstructed, and carries seven guns.

Sarawak.—Two gunboats, of 175 and 118 tons respectively, of low speed, each armed with two guns.

Siam.—Two corvettes (800 tons, 8 guns); six gunboats. One deck-protected cruiser, the Maha Chakrkri, 290 ft. long, 39 ft. 4 in. broad, of 2500 tons displacement and 17 to 18 knots speed; armament, four 4·7-in. quick-firing guns, and ten 6-pr. quick-firing guns. Makut-Rajakamar, 650 tons. The gunboats Bali, Muratha. and Sugrib, 600 tons, one 4·7-in. Q.F., five 2·2 in., four 1·4 in., 12 knots, launched 1898 and 1901. Three modern despatch vessels 100 to 250 tons.

Uruguay.—Gunboats: General Artigas, 274 tons, 12½ knots speed, 2 4·7-in. (Krupp), 2 M.; and General Saurez, 300 tons. The gunboat General Rivera (300 tons) was blown up and sunk off Monte Video, October 8, 1903.

Venezuela.—The gunboats Bolivar (571 tons, 18·6 knots) and Miranda (200 tons, 12 knots); transports Restaurador (568 tons) and Zamora (350 tons).

BRITISH AND FOREIGN TORPEDO-BOAT FLOTILLAS.

Great Britain and Dependencies.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
Great Britain.			Feet	Feet.	Feet.		Tons.		Knots.				Tons.
TORPEDO-BOAT DESTROYERS													
†Ardent	Chiswick ..	1894	201·6	19	7·3	2	247	4,500	27·97	1–12 pr. 5-6 prs.	2	45	60
Banshee	Birkenhead ..	1894	210	19·5	..	2	290	4,400	27·97	1–12 pr. 5–6 prs.	2	50	
†Boxer	Chiswick ..	1894	201·6	19	7·3	2	247	4,500	27·17	1–12 pr. 5–6 prs.	2	45	60
†Bruiser	Chiswick ..	1895	201·6	19	7·3	2	247	4,500	27·97	1–12 pr. 5–6 prs.	2	45	60
*Charger	Poplar	1894	190	18·5	5·25	2	250	3,160	27·98	1–12 pr. 5–6 prs.	2	45	60
Conflict	East Cowes ..	1894	205·6	20	..	2	270	4,370	27·21	1–12 pr. 5–6 prs.	2	50	60
Contest	Birkenhead ..	1894	210	19·5	..	2	290	4,400	27·4	1–12 pr. 5–6 prs.	2	50	60
†Daring	Chiswick ..	1893	185	19	7	2	237	4,300	27·70	1–12 pr. 3–6 prs.	3	45	50
*Dasher	Poplar	1895	190	18·5	5·25	2	250	3,182	26·21	1–12 pr. 5–6 prs.	2	45	60
†Decoy	Chiswick ..	1894	185	19	7	2	237	4,300	27·76	1–12 pr. 3–6 prs.	3	45	50
Dragon	Birkenhead ..	1894	210	19·5	..	2	290	4,500	27·14	1–12 pr. 5–6 prs.	2	50	
Ferret	Birkenhead ..	1893	194	19·25	5	2	280	4,810	27·62	1–12 pr. 3–6 prs.	3	50	70
Fervent	Paisley	1895	200	19	7·8	2	270	3,800	[27]	1–12 pr. 5–6 prs.	2	50	70
†Handy	Fairfield ..	1895	200	19	7·8	2	260	3,800	27·04	1–12 pr. 5–6 prs.	2	50	70
Hardy	Sunderland ..	1895	196	19	5	2	245	4,200	26·8	1–12 pr. 5–6 prs.	2	50	70
†Hart..	Fairfield ..	1895	185	19	7	2	260	4 010	27·07	1–12 pr. 5–6 prs.	2	50	70
*Hasty	Poplar	1894	190	18·5	5·25	2	250	3,250	26·08	1–12 pr. 5–6 prs.	2	45	60
Haughty..	Sunderland ..	1895	196	19	5	2	265	4,000	27·1	1–12 pr. 5–6 prs.	2	50	60
Havock	Poplar	1893	180	18·5	5·25	2	240	3,500	26·77	1–12 pr. 3–6 prs.	3	43	57
Hornet	Poplar	1893	180	18·5	5·25	2	240	4,000	27·31	1–12 pr. 3–6 prs.	3	43	57
†Hunter	Fairfield ..	1895	200	19·7	6·5	2	260	4,000	27·2	1–12 pr. 5–6 prs.	2	45	60
Janus	Jarrow	1895	200	19·7	6·5	2	252	3,789	27·8	1–12 pr. 5–6 prs.	2	50	60
Lightning	Jarrow	1895	200	19·7	6·5	2	252	4,007	27·94	1–12 pr. 5–6 prs.	2	50	60
Lynx	Birkenhead ..	1894	194	19·25	5	2	280	4,000	27·00	1–12 pr. 3–6 prs.	3	50	70
Opossum	Hebburn ..	1895	200	19	5·2	2	290	4,052	28·24	1–12 pr. 5–6 prs.	2	50	60
Porcupine	Jarrow	1895	200	19·7	6·5	2	288	3,866	27·91	1–12 pr. 5–6 prs.	2	50	60
Ranger	Hebburn ..	1895	200	19	5·2	2	264	3,900	27·13	1–12 pr. 5–6 prs.	2	50	60
Rocket	Clydebank ..	1894	205·6	19·5	5·25	2	280	4,200	27·37	1–12 pr 5–6 prs.	2	50	60
Salmon	Hull	1895	200	19·5	5·4	2	264	3,580	27·60	1–12 pr 5–6 prs.	2	50	60
Shark	Clydebank ..	1894	205·6	19·5	5·25	2	280	4,250	27·59	1–12 pr 5 6 prs.	2	50	60
Skate	Barrow	1895	195	20·5	..	2	265	4,100	27·10	1–12 pr. 5–6 prs.	2	50	60
Snapper	Hull	1895	200	19·5	5·5	2	270	4,500	27·9	1–12 pr. 5–6 prs.	2	50	60
Spitfire	Elswick ..	1895	200	19	5·3	2	300	3,780	27·5	1–12 pr. 5–6 prs.	2	45	60
Starfish	Barrow	1894	195	20·5	..	2	265	4,000	27·97	1–12 pr. 5-6 prs.	2	45	60
Sturgeon	Barrow	1894	195	20·5	..	2	265	4,010	27·16	1–12 pr. 5–6 prs.	2	45	60
Sunfish	Hebburn ..	1895	200	19	5·2	2	290	4,292	27·62	1–12 pr. 5–6 prs.	2	50	60
Surly	Clydebank ..	1894	205·6	19·5	5·25	2	280	4,400	28·05	1–12 pr. 5–6 prs.	2	50	50
Swordfish	Elswick ..	1895	200	19	5·3	2	300	4,100	[27]	1–12 pr. 5–6 prs.	2	45	60
Teazer	East Cowes ..	1895	200	19·5	5·6	2	270	4,500	[27]	1–12 pr. 5–6 prs.	2	50	60
Wizard	East Cowes ..	1895	200	19·5	5·2	2	270	4,400	[27]	1–12 pr. 5-6 prs.	2	45	60
Zebra	Blackwall ..	1895	200	20	6	2	300	3,850	27·00	1–12 pr. 5–6 prs.	2	50	60
Zephyr	Paisley	1895	200	19	5·3	2	270	3,850	[27]	1–12 pr. 5–6 prs.	2	50	60
†Albatross	Chiswick ..	1898	227·6	21·25	8·5	2	360	7,900	32	1–12 pr. 5–6 prs.	2	68	100
†Angler	Chiswick ..	1896	210	19·6	7·1	2	278	5,800	30·37	1–12 pr. 5–6 prs.	2	60	80
Arab	Clydebank ..	1901	2 8	20·0	5·6	2	360	6,000	31	1–12 pr. 5–6 prs.	2	60	80
†Ariel	Chiswick ..	1897	210	19·6	7·1	2	278	5,800	30·59	1–12 pr. 5–6 prs.	2	60	80
†Avon	Barrow	1896	210·6	21·6	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Bat	Jarrow	1896	215	20·75	6·8	2	326	6,185	30·1	1-12 pr. 5-6 prs.	2	60	91
†Bittern	Barrow	1897	210·6	21·6	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Brazen	Clydebank ..	1896	218	20·0	5·6	2	300	6,000	30	1-12 pr. 5·6 prs.	2	60	80
†Bullfinch..	Hull	1901	210	20·6	5·8	2	300	5,800	30	1–12 pr. 5–6 prs.	2	60	80
Chamois	Jarrow	1896	215	20·75	6·8	2	325	6,333	30·2	1–12 pr. 5 6 prs.	2	60	91
†Cheerful	Hebburn ..	1897	210	21·0	8	2	308	6,000	30	1–12 pr. 5–6 prs.	2	62	82
†Coquette	Chiswick .	1898	210	19·5	7·2	2	285	5,800	30·31	1–12 pr. 5–6 prs.	2	60	80
Crane	Jarrow	1896	215	20·7	6·8	2	324	6,336	30·3	1–12 pr. 5 6 prs.	2	60	80
†Cygnet	Chiswick ..	1898	210	19·5	7·2	2	285	5,800	30·35	1–12 pr. 5–6 prs.	2	60	80
†Cynthia	Chiswick ..	1898	210	19·5	7·2	2	285	5,800	30·2	1–12 pr. 5–6 prs.	2	60	80
†Desperate	Chiswick .	1895	210	19·6	7·2	2	275	5,800	30	1–12 pr. 5–6 prs.	2	60	80
†Dove	Hull	1901	210·0	20·6	5·8	2	300	5,800	30	1–12 pr. 5–6 prs.	2	60	80
Earnest	Birkenhead ..	1896	210·6	21·7	5·3	2	300	6,000	30·13	1-12 pr. 5–6 prs	2	58	80
Electra	Clydebank .	1901	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Express	Birkenhead ..	1897	227 6	22·0	9	2	300	9,000	31	1–12 pr. 5–6 prs.	2	60	80
Fairy	Fairfield ..	1897	227·6	22·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
†Falcon	Fairfield ..	1901	220	21·3	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
†Fame	Chiswick ..	1896	210·6	19·6	7·1	2	275	5,800	30·16	1-12 pr. 5 6 prs.	2	60	80

* Built by Yarrow, fitted with Thornycroft W. T. boilers at Earle's. All Jarrow-built destroyers have Reed's boilers. Vessels marked † have Thornycroft W. T. boilers.

The Cobra and Viper have been lost.

Great Britain and Dependencies—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Mean Speed on Trial, or expected.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO BOAT DESTROYERS			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
Fawn	Jarrow	1897	215	20·7	6·8	2	325	6,581	30·5	1–12 pr. 5–6 prs.	2	60	91
Flirt	Jarrow	1897	215	20·7	6·8	2	323	6,682	30	1–12 pr. 5–6 prs.	2	60	91
Flyingfish	Jarrow	1897	215	20·7	6·8	2	323	6,416	30·4	1–12 pr. 5–6 prs.	2	58	91
†Foam	Chiswick	1896	210	19·6	7·1	2	275	5,800	30 18	1–12 pr. 5–6 prs.	2	58	80
Gipsy	Fairfield	1897	227·6	22·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Greyhound	Hawthorn's	1900	210	21	8·6	2	316	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Griffon	Birkenhead	1896	210·0	20	5·3	2	300	6,000	30·11	1–12 pr. 5–6 prs.	2	58	80
Kestrel	Clydebank	1901	218	20·0	5 6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Kangaroo	Jarrow	1901	215	20·75	6·8	2	335	6,500	30	1–12 pr. 5–6 prs.	2	..	91
†Lee	Sunderland	1899	210 0	19·9	7·6	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Leopard	Barrow	1897	210	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Leven	Fairfield	1901	218 0	20.0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Lively	Clydebank	1901	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Locust	Birkenhead	1896	210	21·7	5·3	2	300	6,000	30·16	1–12 pr. 5–6 prs.	2	58	80
†Mallard	Chiswick	1896	210·6	19·6	7·1	2	275	5,800	30·11	1–12 pr. 5–6 prs.	2	60	80
Mermaid	Hebburn	1898	210	21 0	8	2	308	6,000	30	1–12 pr. 5–6 prs.	2	62	82
Myrmidon	Jarrow	1901	215	20·75	6·8	2	335	6,500	30	1–12 pr. 5–6 prs.	2	..	91
*Orwell	Birkenhead	1901	218·0	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Osprey	Fairfield	1901	227·6	22·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
†Ostrich	Fairfield	1901	210	21·0	9	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Otter	Barrow	1896	210	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	60	80
Panther	Birkenhead	1897	210·6	21·7	5·3	2	300	6,000	30·14	1–12 pr. 5–6 prs.	2	58	80
Peterel	Jarrow	1899	215	20·75	6·8	2	334	6,500	30	1–12 pr. 5–6 prs.	2	..	91
Quail	Birkenhead	1895	213·6	21·6	5·3	2	300	6,000	30·38	1–12 pr. 5–6 prs.	2	58	90
Racehorse	Hawthorn's	1900	210	21	8·6	2	316	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Recruit	Glasgow	1901	218·0	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Roebuck	Hawthorn's	1901	210	21	8·6	2	316	6,000	30	1–12 pr. 5–6 prs.	2	60	90
Seal	Birkenhead	1897	218·0	20·0	5·6	2	300	6,000	30·15	1–12 pr. 5–6 prs.	2	58	80
Sparrowhawk	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
Spiteful	Jarrow	1898	215	20·75	6·8	2	334	6,500	30·1	1–12 pr. 5–6 prs.	2	..	91
Sprightly	Clydebank	1901	218	20·0	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
†Stag	Chiswick	1899	210	19·75	7·2	2	285	5,800	30	1–12 pr. 5–6 prs.	2	60	80
Star	Jarrow	1896	215	20·75	6·88	2	328	6,266	30·7	1–12 pr. 5–6 prs.	2	58	91
Success	Sunderland	1901	210·0	21·0	9·2¼	2	350	6,000	30	1–12 pr. 5–6 prs.	2	62	43
†Sylvia	Sunderland	1901	210	19·9	7·6	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Syren	Jarrow	1901	215	20·75	6·8	2	335	6,500	30	1–12 pr. 5–6 prs.	2	..	91
Thorn	Glasgow	1901	210	21	5·5	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Thrasher	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5 6 prs.	2	58	80
Tiger	Glasgow	1901	210	21	5·5	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Vigilant	Glasgow	1901	210	21	5·5	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
†Violet	Sunderland	1901	210	20·75	6·88	2	283	5,400	30	1–12 pr. 5–6 prs.	2	58	80
Virago	Birkenhead	1896	210·6	21·7	5·3	2	300	6,000	30·13	1–12 pr. 5–6 prs.	2	58	80
*a*Vixen	Barrow	1901	210·0	20·0	5·8	2	327	6,000	30	1–12 pr. 5–6 prs.	2	62	88
Vulture	Clydebank	1901	218	20	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Whiting	Jarrow	1896	215	20·75	6·88	2	330	6,239	30·2	1–12 pr. 5–6 prs.	2	58	91
Wolf	Birkenhead	1897	218	20	5·6	2	300	6,000	30	1–12 pr. 5–6 prs.	2	58	80
Derwent	Hawthorn	1903	220	23	10	2	534	7,000	25	1–12 pr. 5–6 prs.	2	70	130
‡Eden	Parsons	,,	220	23	8¾	6	527	7,000	25	1–12 pr. 5–6 prs.	2	70	130
Exe	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5 6 prs.	2	70	95
													127
Ribble	Yarrow	,,	225	23½	10	2	550	7,500	26	1–12 pr. 5–6 prs.	2	70	120
Itchen	Laird	,,	225	23½	10	2	550	7,000	25½	1–12 pr. 5–6 prs.	2	70	130
Usk	Yarrow	,,	225	23½	10	2	550	7,500	26	1–12 pr. 5–6 prs.	2	70	120
Teviot	Yarrow	,,	225	23½	10	2	550	7,500	26	1–12 pr. 5–6 prs.	2	70	120
Ettrick	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5–6 prs.	2	70	95
													127
Foyle	Laird	,,	225	23½	10	2	550	7,000	25½	1–12 pr. 5–6 prs.	2	70	120
Erne	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5 6 prs.	2	70	95
													127
Arun	Laird	,,	225	23½	10	2	550	7,000	25½	1–12 pr. 5–6 prs.	2	70	130
Blackwater	Laird	,,	225	23½	10	2	550	7,000	25½	1–12 pr. 5 6 prs.	2	70	130
Cherwell	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5–6 prs.	2	70	95
													127
Dee	Palmer	,,	225	23½	10	2	540	7,000	25½	1–12 pr. 5–6 prs.	2	70	95
													127
Jed	Thornycroft	1904	225	23½	10	2	540	7,000	25½	1–12 pr. 5–6 prs.	2	70	130
Kennet	Thornycroft	1903	225	23½	10	2	540	7,000	25½	1–12 pr. 5–6 prs.	2	70	130
‡Velox	Parsons	,,	210	23	8½	8	440	8,000	27	1–12 pr. 5 6 prs.	2	63	90
Waverney	Hawthorn	,,	220	23½	10	2	534	7,000	25	1–12 pr. 5–6 prs.	2	70	130
Welland	Yarrow	,,	225	23½	10	2	550	7,500	26	1–12 pr. 5–6 prs.	2	70	120
Fourteen new boats, Programme 1904–5. Details not known.													
TORPEDO BOATS—FIRST CLASS—													
1 (*ex* Lightning)	Chiswick	1877	84·6	10·9	5	1	27	460	19	..	1	..	
2–9 (8 boats)	Chiswick	1878–9	87	10·9	4	1	28	450	20	..	1	15	
10	Chiswick	1880	90·5	10·9	4	1	28	450	21·7	..	1	15	
11, 12 (2 boats)	Chiswick	1880	87	10·9	4	1	28	450	20	..	1	15	7
13	Lambeth	1878	87	10·9	4	1	28	460	21	..	2	15	7
14	Poplar	1878	87	11	4·5	1	33	550	22	..	2	15	7
15	..	..	87	10·9	4	1	28	450	21	..	2	15	7

* Under repair after collision.

‡ Hulls and Yarrow boilers of these vessels by Hawthorn Leslie & Co.

a Has four Express W. T. boilers.

Great Britain and Dependencies—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
TORPEDO BOATS.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FIRST CLASS—*cont.*													
17, 18 (2 boats)	Poplar	1877	86	11	4·5	1	33	450	21	..	2	15	7
19	East Cowes ..	1878	87	10·9	4	1	28	460	21	..	2	15	7
20	..	1880	87	10	4	..	28	360	16·9	..	2	15	
21, 22 (2 boats)	Chiswick ..	1885	113	12·5	5·7	1	63	730	20	..	3	..	10
23, 24 (2 boats)	Poplar	1885–6	113	12·5	5·5	1	67	600	19·5	2–3 prs.	3	..	
25–29 (5 boats)	Chiswick ..	1886	127·5	12·5	6·2	1	60	600	21	..	4	15	
30–33 (4 boats)	Poplar	1886	125	13	5·5	1	60–66	670	19·5	2–3 prs.	5	15	20
*a*34–38 (5 boats)	East Cowes ..	1886	125	14·6	4	1	60–66	950	18–19	..	5	15	
39, 40 (2 boats)	Poplar	1885	100	12·5	..	..	40	500	..	..	1	15	
41–60 (20 boats)	Chiswick ..	1886	127·5	12·5	6·2	1	60	700	21	2–3 prs.	4	15	
61, 63–74, 76–78 (16 boats)	Poplar .. .	1886	125	13	5·5	1	75	700	19–20	2–3 prs.	5	15	20
79	Poplar	1886	125	13	5·5	..	75	1,000	22·4	2–3 prs.	..	15	20
80	Poplar	1887	135	14	6	1	105	1,540	23	4–3 prs.	5	21	30
81 (*ex* Swift)	East Cowes ..	1885	150	17·5	..	1	125	..	..	6–3 prs.	3	25	35
82–87 (6 boats)	Poplar	1889	130	13·5	5·5	1	85	1,100	23	3–3 prs.	3	19	20
88, 89 (2 boats)	Poplar	1894	142	14·75	4·5	1	112	1,600	..	3–3 prs.	3	18	20
90	Poplar	1895	140	14·25	3·7	1	100	1,430	..	3–3 prs.	3	18	18
91, 92 (2 boats)	Chiswick ..	1894	140	15·5	7·5	1	130	2,400	23–24	3–3 prs.	3	18	25
93	Chiswick ..	1893	140	15·5	5·4	2	130	2,200	23·5	3–3 prs.	3	18	25
94–96 (3 boats)	East Cowes ..	1894	140	15·5	..	1	130	2,000	23·2	3–3 prs.	3	18	25
97	Birkenhead ..	1893	140	15·5	..	1	130	2,690	23·35	3–3 prs.	3	18	25
b {98 and 99 .. .. .. / 107 and 108 .. .. ..}	Chiswick ..	1901	160	17	8·4	1	178	2,850	25	3–3 prs.	3	32	20
109–113	Chiswick ..	1902	166	17·25	8·4	1	200	2,9 0	25	3–3 prs.	3	32	42
114–117	Cowes	1903	165	17·6	8·8	1	205	2,900	25	3–3 prs.	3	32	23
SECOND CLASS—													
38–48 (10 boats)	Poplar	1889	60	9·2	3·7	1	16·5	230	16·5	1 mach.	1	9	11
49, 50 (2 boats)	Poplar	1887	60	8·5	3	1	15	200	17	1 mach.	1	9	
51–62 (12 boats)	Chiswick ..	1878–9	60·5	7·5	3·5	1	..	..	16·5	..	2	7	
63	..	1879	60	..	..	1	..	..	15	..	2		
64–73 (10 boats)	Chiswick ..	1880–1	60·5	7·5	3·5	1	..	..	16–17	..	2	7	
74, 75, 96, 97 (4 boats)..	Poplar	1883	62	7·6	3·6	1	12	..	16	1 mach.	2	7	
76–95 (20 boats)	Chiswick .	1882–3	63	7·5	3·5	1	..	..	16·5–17	..	2	7	
98	Chiswick ..	1883	66·3	7·5	2·5	hyd.	..	120	12·6	..	2	7	
99, 100 (2 boats)	Chiswick ..	1886	64	8	3·6	1	..	..	16–16·8	..	2	7	
101	..	..	64	..	..	..	..	..	..	..	2	7	
1–9 (9 boats)	East Cowes ..	..	56	..	..	1	12	..	14·5	2 mach.	sp	..	·7
COLONIAL, ETC.—													
Victoria.													
Childers	Chiswick ..	1883	113	12·5	5·9	1	65	730	20	2–1 prs.	..	12	10
One boat	Poplar	1891	130	13·5	5·7	1	82	1,150	23	3–3 prs.	3	19	20
Nepean, Lonsdale (2 boats)	Chiswick ..	1884	63	7·5	3·2	1	12	150	17·5	..	1	7	
New South Wales.													
Acheron, Avernus (2 boats)	..	1879	..	..	..	1	16	300	16				
Queensland.													
Mosquito	Chiswick ..	1884	63	7·5	3·2	1	12	..	17	..	1	7	
Wasp	..	..	..	..	..	..	12	..	..	..	..	7	
Tasmania.													
One boat	Chiswick ..	1884	63	7·5	3·2	1	12	..	17	..	1	7	
New Zealand.													
Nos. 1–4 (4 boats)	Chiswick ..	1881	63	7·5	3	1	12	170	17	1 mach.	Sp.		
India.													
Nos. 1–3 (3 boats)	Chiswick ..	1888	131·5	14·8	7·1	1	96	1,270	23·2	2 Q.F.	5		
Nos. 4–6 (3 boats)	East Cowes ..	1889	130	14·6	..	..	95	1,030	20				
No. 7	Paisley	1888	130·4	14	..	..	92	1,060	21				
SUBMARINES—													
5 boats (Nos. 1–5*) ..	Barrow	1901–2	63·4	11·9	..	1	120	{160 / 70}	{10 / 7}	..	1	7	..
4 boats (Nos. A 1–A 4†, programme 1902–03).	Barrow	1903	100	10	..	1	180	150	{15 / 10}	..	2	..	11
10 new boats (Nos. A5–A14‡, (programme 1903–4).	Barrow	..	150	..	..	..	..	..	16	..	..	..	..
10 new boats (programme 1904–5).	Barrow	..	..	..	..	..	..	..	..	..	..	..	..

a No. 34 is fitted with Laird W. T. boilers. *b* Water-tube boilers of Thornycroft type.
* No. 2 on trial did 12 knots on the surface and 8 knots submerged. † A 1 sunk at Spithead.
‡ A 14 is used as an experimental boat only.

Argentine Republic.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Corrientes	Poplar.. ..	1896	190	19 6	7·4	2	280	4,000	27·4 t.	*1 14-pr.	3	54	80
Missiones..	Poplar.. ..	1896	190	19·6	7·4	2	280	4,000	26·0 t.	3 6 pr,	3	54	80
Entre Rios	Poplar.. ..	1896	190	19·6	7·4	2	280	4,000	26 7 t.	Q.F., 2 M.	3	54	80
FIRST CLASS—													
2 boats	Chiswick ..	1890–1	150	14·5	5·2	2	110	1,500	24·52	3 3-prs.	3	27	22
6 boats	Poplar.. ..	1890	130	13·5	6	1	85	1,200	23–24	2 3-pr. Q.F.	2	15	15
4 boats	Poplar.. ..	1880–2	100	12·5	6	1	52	600	20	2 mach.	3	14	10
SECOND CLASS—													
Nos. 1–8 (8 boats)..	Poplar.. ..	1890	60	9.2	3	1	16	230	17	1 Q.F.	1	10	1·25
Nos. 9–10 (2 boats)	Chiswick ..	1881	60	7·5	3·5	1	16	230	17	..	1		

The two 150-ft. boats are named Comodoro Py and Murature.

The six 130-ft. boats are named Bathurst, Buchardo, Jorge, King, Pinedo, and Thorne. They have locomotive boilers.

The four 100-ft. boats are named Alerta, Centelia, Ferre, and Py.

* ¼-in. plating over entire engine and boiler space (Yarrow W.T. boilers).

Austria-Hungary.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Adler, Falke	Poplar.. ..	1886	135	13·7	5·6	1	95	900	22·4	2 Nord.	2	16	28
22 boats	Elbing, Trieste, &c.	1886-9	128	15·9	6·9	1	83	900 1,000	17·5 to 21·5	2 mach.	2	15	28
Boa .. .. / Cobra .. .. .. / Kigyo .. .. .. / Python	Poplar.. ..	1898–9	152·6	15·3	7·6	1	133	2,000	24·3	2 3-pr. Q.F.	3	24	30
Viper	Poplar.. ..	1896	147·6	14·9	7·6	1	130	2,000	26·5	2 3-pr. Q.F.	2	26	30
Natter	Elbing ..	1896	150	17·5	8·8	2	152	2,300	26·5	2 3-pr. Q.F.	3	..	30
SECOND CLASS—													
Nos. 9, 10 (2 boats)	Chiswick, Poplar, Pola and Elbing	1881	98·5	10·8	2·9	1	37	450	17	1 Q.F.	1		
Nos. 11-32 (22 boats)	Chiswick, Poplar, Pola and Elbing	1883-7	107	11·6	3·1	1	47	600	17	1 Q.F.	1		
Nos. 33-39 (7 boats)	Chiswick, Poplar, Pola and Elbing	1887-91	118·1	14·4	3·3	1	64	700	18	2 Q.F.	1		
Nos. 2-8 (7 boats) ..	Pola and Poplar ..	1878 81	87·4	9·6	2·8	1	27	300	15	..	1		

No provision is made for the building of torpedo craft in 1903.

Brazil.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FIRST CLASS—													
Nos. 1–5 (5 boa's)	Poplar.. ..	1882	100	12·5	5·5	1	52	600	20	2 mach.	2	16	20
Araguary	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·1	2 Q.F.	4	27	22
Iguatemi	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·4	2 Q.F.	4	27	22
Marcilio Diaz	Chiswick ..	1891	150	14·5	5·2	2	150	1,550	25·8	2 Q.F.	4	27	22
5 boats	Elbing ..	1892–3	152	17·2	7·9	2	130	2,200	28	2–1 prs.	3	24	30
Piratiny	..	..	130	12	..	..	..	..	10	2–1 pr.	1		
Poty	..	..	126	12	3	..	30	..	18	1–1 pr.	1		
SECOND CLASS—													
Inhanhuay (wood)..	New York..	1893	90	10	3	..	17	..	25	1–1 pr.	1	10	
4 boats	..	1883–4	..	..	..	1	17	..	17				
1 boat	Chiswick ..	1885	63	75	3·2	1	..	..	17	..	..	..	2
1 boat	Poplar.. ..	1886	60	8	3	1	14	200	17	..	1		
THIRD CLASS—													
Moxoto	Poplar.. ..	1883	60	9·3	..	..	..	..	16	1–1 pr.	1		
5 boats	Chiswick ..	1883	45	6	1·2	1	3·5	..	12–13	1 mach.	sp.		

Two submarine boats, Jacinto Gomez and Mello Marques, in hand.

Chili.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Capitan Orella ..	Birkenhead.	1896	210	21·6	5·4	2	300	6000	30·17	1-12 pr. Q.F. 5·6 pr.	2	65	90
Capitan Munoz Gamero.. ..	Birkenhead.	1896	210	21·6	5·4	2	300	6000	30·42	1-12 pr. Q.F. 5–6 pr.	2	65	90
Teniente Serrano ..	Birkenhead.	1896	210	21·6	5.4	2	300	6000	30·35	1–12 pr. Q.F. 5·6 pr.	2	65	90
Guardia-Marina Riquelme ..	Birkenhead.	1896	210	21·6	5·4	2	300	6000	30·69	1-12 pr. Q.F. 5-6 pr.	2	65	90
Capitan Merino Tarpa .. .. .. Capitan O'Brien ..	Birkenhead.	1901	210	21·6	5·4	2	350	6000	30	Do.	2	65	90
FIRST CLASS—													
3 boats	Poplar.. ..	1881	86	12·5	..	1	25	400	19–20	..	4	15	
5 boats	Poplar.. ..	1881	100	12·5	..	1	35	400	18–19	4 mach.	4	15	9
Sarjento Aldea ..	Poplar.. ..	1886	125	13·5	5·5	1	70	800	20	2 Q.F.	4	18	15
Injeniero Hyatt, Cirujano Videla, Injeniero Mutilla, Guardia-Marina Contreras, Capitan Thompson, and Teniente Rodriguez (Viper type) ..	Poplar.. ..	1896 1898	152·6	15·3	7·9	1	140	2200	27·5 27·2	3-3 pr. Q.F.	3	28	40
Janequeo, Guale, Rucumilla, and Guacolda	Poplar.. ..	1881	100	12·5	..	1	..	450	..	..	..	..	
Tegualda, Quid ra, and Fresia	Poplar.. ..	..	87	10·9	..	1	..	400	..	..	..	..	
SECOND CLASS—													
1 boat	East Cowes	1887	50	..	..	..	..	..	16	..	..	..	
1 boat	East Cowes	1892	60	9·6	5	1	15	270	19	..	1	..	
1 boat	La Seyne ..	1895	42	8·6	..	1	..	..	..	..	1	..	

The Thompson and Rodriguez were sent out in sections, and put together at Talcahuano and Valparaiso.

The torpedo boat Injeniero Mery was totally wrecked at San Antonio, March, 1903.

China.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons
FIRST CLASS—													
1 boat	Elbing ..	1886	144·3	16·4	7·5	1	128	1,400	24·2	4 1-pr. revs.	2	20	15
1 boat	Poplar.. ..	1887	128	13	5	1	69	1,000	23·9	{3 Q.F., 4 Gatlings}	3	28	15
25 boats	Stettin, &c..	1886–87	110	13	4·9	1	65	1,000	19·5	1-pr. revs.	3	16	10
2 boats	Stettin ..	1883	86	10·4	3·4	1	28	650	18·2	1-pr. revs.	2	16	12
1 boat	Stettin ..	1884	123·5	21·7	..	..	..	..	19	..	5	16	
2 boats	Elbing ..	1895	128	15·8	..	..	120	1,250	24·5	Q.F.	2		
SECOND CLASS—													
11 boats	Elbing ..	1885–86	85	11·9	4·8	1	27	400	19	..	1	..	5
1 boat	Foochow ..	Bldg.	88·6	6·7	3·3	1	30	550	20·5				

About twenty boats only are said to be serviceable. The four destroyers built at Elbing in 1898–9 were captured by the Allies at Taku, 1900, and added to the Navies of Great Britain, France, Germany and Russia.

Costa Rica.

Costa Rica has one 62-ft., 15-knot boat.

Denmark.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FIRST CLASS—													
Hajen	Copenhagen	1896											
Havörnen	Copenhagen	1897	151·3	15·4	7·9	2	142	2,317	22·9	{1 4·7-in., 1 1-pr.}	3	..	..
Söbjörnen	Copenhagen	1898											
Delfinen	Chiswick ..	1883	111·5	12·6	6	1	59	620	20	1 mach.	2	14	9
Havhesten	Chiswick ..	1888	137·9	11	7	1	94	1,200	22·8	2 1-pr. revs.	4	20	15
Hvalrossen	Chiswick ..	1884	114	12·6	6·5	1	64	660	18·7	1 mach.	2	14	10
Makrelen	Copenhagen	1893	140	14·2	7	2	112	1,200	..	..	..	..	16
Narhvalen	Chiswick ..	1888	137·9	14	7	1	94	1,200	22·3	2 1-pr. revs.	4	20	15
Nord Kaperen.. ..	Copenhagen	1893	140	14·2	7	2	112	1,200	..	2 1-pr. revs.	4	..	16
Sölöven	Chiswick ..	1887	131	11·8	6·8	1	89	1,200	23·3	2 mach.	4	20	14
Sóulven	Havre.. ..	1880	94·8	10·9	3·9	1	37	450	18·1	..	2	12	5
Springeren	Copenhagen	1891	119	13	4·9	1	81	800	18·3	2 1-pr. revs.	2	20	14
Stören	Chiswick ..	1887	131	14·8	6·8	1	89	1,200	23	2 mach.	4	20	14
Sværdfisken	Chiswick ..	1881	110	12	6	1	49	600	20·7	1 mach.	2	14	9
SECOND CLASS—													
Nos. 4, 5 (2 boats) ..	Chiswick ..	1882	63	7·5	2·5	1	15	150	16·9	1 mach.	2	6	1
Nos. 6, 7 (2 boats) ..	Chiswick ..	1884	66·8	8	4·2	1	16	170	15·4	1 mach.	2	6	1·5
Nos. 8, 9 (2 boats) ..	Chiswick ..	1886	69·5	8·1	3·8	1	17	170	15·7	1 mach.	2	6	1
Nos. 10, 11 (2 boats).	Chiswick ..	1888	70·2	8	4	1	18	180	15·8	1 mach.	2	6	1
Nos. 12, 13 (2 boats).	Chiswick ..	1889	78·3	9	4·9	1	21	350	18	1 mach.	2	8	3
1 boat	Chiswick ..	1875	58	7·5	3	1	..	..	16	..	sp.		

Four destroyers and two boats are provided for.

France.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Arbalète	Normand ..	1903	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Arc	Châlon ..	Bldg.	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Arquebuse..	Normand ..	1902	183·9	20·11	10 3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Baliste	Rouen ..	Bldg.	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Bélier	Nantes ..	1903	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Bombarde	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6000	30·5	1-9pr. 6-3prs.	2	62	75
Carabine	Rochefort ..	1902	183·9	20·11	10·3	2	305	6300	28	1-9pr. 6-3prs.	2	62	75
Catapulte	Havre (F.&C.)	1903	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Claymor	..	Bldg.	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Dard	Rouen ..	1903	183·9	20·11	10·3	2	310	6500	28	1-9pr. 6 3prs.	2	62	75
Durandal	Normand ..	1899	180·5	20·8	10·3	2	300	5000	27·4	1-9pr. 6-3prs.	2	62	84
Épée	Havre (F.&C.)	1900	183·9	20·8	10·3	2	319	5700	26	1-9pr. 6-3prs.	2	62	75
Epieu	Normand ..	1903	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Escopette	Rochefort ..	1900	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	62	75
Fauconneau	Normand ..	1900	183·9	20·8	10·3	2	300	5000	27·1	1-9pr. 6-3prs.	2	62	84
Flamberge..	Rochefort ..	1901	183·9	20 8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	62	75
Francisque..	Rochefort ..	Bldg.	183·9	20·11	10·3	2	305	6300	28	1-9pr. 6-3prs.	2	62	75
Fronde	Bordeaux ..	1903	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	65
Hallebarde	Normand ..	1899	180·5	20·8	10·3	2	305	5300	27·2	1-9pr. 6-3prs	2	62	84
Harpon	Bordeaux ..	1903	183·9	20·11	10·3	2	300	6000	28	1 9pr. 6-3prs.	2	62	75
Javeline	Nantes ..	1903	183·9	20·11	10 3	2	300	7000	29·3	1-9pr. 6 3prs	2	62	75
Mortier	..	Bldg.	183·9	20·11	10·3	2	305	6300	28	1-9pr. 6-3prs.	2	62	75
Mousquet	Nantes ..	1902	183·9	20·11	10·3	2	300	6300	30 2	1-9p . 6-3prs.	2	62	75
Mousqueton	Châlon ..	1903	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Obusier	..	Bldg.	183·9	20·11	10·3	2	305	6300	28	1-9pr. 6-3prs.	2	62	75
Pertuisane	Rochefort ..	1900	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6 3prs.	2	62	75
Pierrier	..	Bldg.	183·9	20·11	10·3	2	305	6300	28	1-9pr. 63-prs.	2	62	75
Pique	Havre (F.&C.)	1900	183·9	20·8	10·3	2	319	5700	26	1-9pr. 6-3prs	2	62	75
Pistolet	Nantes ..	1903	183·9	20·11	10·3	2	300	6000	28	1-9pr. 6-3prs.	2	62	75
Rapière	Rochefort ..	1901	183·9	20·8	10·3	2	300	5700	26	1-9pr. 6-3prs.	2	62	75
Sabre	Rochefort ..	Bldg.	183·9	20·11	10·3	2	305	6300	28	1-9pr. 6-3prs.	2	62	75
Sagaie..	Havre(F.&C.)	1902	183·9	20·11	10·3	2	300	6000	30·1	1-9pr. 6-3. rs.	2	62	75
Sarbacane	Rochefort ..	1903	183·9	20·11	10·3	2	305	6300	28	1-9pr 6-3prs.	2	62	75
Stylet	Rochefort ..	Bldg.	183·9	20·11	10·3	2	305	6300	..	1-9pr. 6-3prs.	2	62	75
Takou *	Elbing ..	1898	193·7	21·0	..	2	280	6000	35	6-3 pr. Q F.	2	62	67
Tromblon	Rochefort ..	Bldg.	193·7	21 0	..	2	305	6300	35	6-3 pr. Q.F.	2	62	67
Yatagan	Nantes ..	1900	183 9	20·8	10·3	2	319	5700	26	1-9pr. 6-3prs.	2	62	33
M 38, 39	Dockyards ..	Bldg.	183 9	19·6	10·3	2	335	7200	30	1–9 pr.	2	62	37
16 Boats	Private yards												
SEA-GOING—													
Agile	La Seyne ..	1889	139	14·7	7·7	2	121	1,100	20·4	3–3 prs.	2	26	14
Alarme	St. Nazaire	1889	151	15·7	8·3	2	169	1,400	20·5	2–3 prs.	4	30	40
Aquilon	Normand ..	1895	137·8	14·6	7·9	2	127	2,000	2 ·17	2–3 prs.	2	31	17
Archer	Normand ..	1893	138	14·7	6·5	2	131	1,250	21	2–3 prs.	2	26	17
Argonaute..	St. Denis ..	1893	141	16·4	9·3	2	132	1,500	25·1	2–3 prs.	2	31	16
Audacieux..	Nantes ..	1900	144·2	15·2	10·0	2	152	4,200	30	2–3 prs.	2	..	18
Aventurier	St. Nazaire..	1889	151	15·7	8·3	2	174	1,400	20·5	2–3 prs.	4	31	40
Averne	Havre (F.&C.)	1894	141	16·4	9·3	2	133	1,500	24·4	2–3 prs.	2	27	16
Borée	Bordeaux ..	1900	147·7	16·7	8·0	2	160	4,400	30	2–3 prs.	2	..	18
Bourrasque	Normand ..	1901	147·7	16·7	8·0	2	160	4,400	31·41	2–3 prs.	2	..	18
Cerbère	..	1899	137 8	14·6	7·9	2	127	2,000	25	2–3 prs.	2	34	17
Chevalier	Normand ..	1893	144·3	15·7	6·8	2	131	2,700	27·2	2–1 prs.	2	32	17
Corsaire	St. Denis ..	1893	160·5	15	5·4	2	171	2,500	25·5	4–1 prs.	2	32	15
Coureur	Chiswick ..	1888	147·5	14·5	4·6	2	129	1,550	23·28	4 Nords.	2	27	22
Cyclone (ex-Tenare) ..	Normand ..	1898	144·2	15·2	10·0	2	152	4,200	30	2–3 prs.	2	..	18
Dauphin	Havre (F.&C.)	1894	141	16·4	9·3	2	137	1,500	25·22	2–3 prs.	2	31	16
Défi	St. Nazaire..	1889	151	15·7	8·3	2	173	1,400	21	2–3 prs.	4	30	40
Dragon	Normand ..	1892	138	14·7	8·2	2	129	1,400	25	2–3 prs.	2	26	15·5
Eclair	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·5	3–3 prs.	2	26	17
Flibustier	Normand ..	1894	143	16·4	9·3	2	132	1,500	23·5	2–3 prs.	2	34	16
Forban	Normand ..	1895	144·2	15·2	10	2	135	3,200	31·2	2–1 prs.	2	..	..
Grenadier	Normand ..	1892	138	14·7	8·2	2	129	1,400	25·25	2–3 prs.	2	26	15·5
Grondeur	Havre (F.&C.)	1892	147·5	14·5	5	2	130	1,550	24	2–3 prs.	2	27	20
Kabyle	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·6	3–3 prs.	2	27	17
Lancier	Normand ..	1893	138	14·7	8·2	2	128	1,400	25·79	2–3 prs.	2	26	15·5
Mangini	Nantes ..	1896	147·6	14·8	7·9	2	129	2,100	27·5	2–3 prs.	2	34	17
Mistral	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2–3 prs.	3	..	23
Mousquetaire	Havre (F.&C.)	1892	154	15·7	7	2	150	2,100	24·77	2–1 prs.	2	32	18
Orage	La Seyne ..	1891	144·3	14·7	7·7	2	128	1,100	21·7	3–3 prs.	2	26	17
Ouragan	Nantes ..	1887	151	15·7	8·3	2	174	1,400	20	2–3 prs.	4	30	40
Rafale..	Normand ..	1901	147·7	16·7	8·0	2	160	4,400	31·47	2–3 prs.	2	..	18
Sarrasin	Bourdeaux..	1893	139	14·7	7·7	2	131	1,100	20·5	3–3 prs.	2	26	14
Simoun	Havre (F.&C.)	1901	144·2	15·2	10·0	2	152	4,200	30	2–3 prs.	2	..	18
Siroco	Normand ..	1901	147·7	16·8	8·8	2	182	4,200	30	2–3 prs.	3	..	23
Téméraire	St. Nazaire..	1889	151	15·7	8·3	2	171	1,400	21	2–3 prs.	4	30	40
Tourbillon	Bourdeaux..	1892	139	14·7	7·7	2	131	1,100	20·5	3–3 prs.	2	26	14
Tourmente	St. Denis ..	1893	141	16·4	9 3	..	132	1,500	21·6	2–3 prs.	2	25	15
Tramontane	Bordeaux ..	1900	147 7	16·7	8·0	2	160	4,400	30	2–3 prs.	2	..	18
Trombe	Nantes ..	1900	144·2	15·2	10·0	2	152	4,200	30	2–3 prs.	2	..	18
Turco	St. Denis ..	1892	138	14·7	8·2	2	124	1,400	21·3	2–3 prs.	2	26	15·5
Typhon	Havre (F.&C.)	1901	144·2	15·2	10 0	2	152	4,200	30	2–3 prs.	2	..	18
Véloce..	Havre (F.&C.)	1892	147·5	14·5	5	2	130	1,550	23·6	2–3 prs.	2	27	20
Zouave	St. Denis .	1892	138	14·7	8·2	2	124	1,400	21·3	2–3 prs.	2	26	15·5

* Captured from the Chinese at Taku, 1900. N.B.—"F. & C." "Forges et Chantiers." "Normand" means that the boat has been built at that firm's yard at Havre.

France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Dimensions. Beam.	Dimensions. Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
FIRST CLASS—													
Balny	Normand ..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Bouët-Willaumez	St. Denis ..	1888	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Capt. Cuny	..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Capt. Mehl	..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Challier	..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Dehorter	St. Denis ..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Deroulède	Normand ..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Doudart de Lagrée	Normand ..	1886	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
Edmond Fontaine	St. Denis ..	1888	134·5	11	7·2	1	66	700	20	2–1 pr. rev.	2	21	12
126–129 (4 boats)	Normand ..	1889–0	118	13·2	8·6	1	80	1,250	21	2–1 prs.	2	21	10
145–149 (5 boats)	Normand ..	1891–3	118	13·2	8·7	1	79	1,300	23·9	2–1 prs.	2	21	10
152–154 (3 boats)	Normand ..	1892–3	118	13·2	8·7	1	80	1,300	24·6	2–1 prs.	2	21	10
155–157 (3 boats)	Bordeaux ..	1893	118	13·2	8·7	1	80	1,300	23	2–1 prs.	2	21	10
158–160 (3 boats)	Cail	1893	118	13·2	8·7	1	80	1,300	23	2–1 prs.	2	21	10
161–163 (3 boats)	St. Nazaire ..	1892	118	13·2	8·7	1	80	1,300	23	2–1 prs.	2	21	10
164–166 (3 boats)	La Seyne ..	1892	118	13·2	8·7	1	79	1,300	23	2–1 prs.	2	21	10
167–169 (3 boats)	Creusot ..	1892	118	13·2	8·7	1	81	1,300	23	2–1 prs.	2	21	10
170, 171 (2 boats)	Normand ..	1893	118	13·2	8·7	1	80	1,300	23–2	2–1 prs.	2	21	10
172, 173 (2 boats)	Havre	1893–4	118	13·2	8·7	1	89	1,390	23–24	2–1 prs.	2	21	10
174–176 (3 boats)	Havre	1893–5	118	13·2	8·7	1	94	1,390	23–24	2–1 prs.	2	21	10
177–179 (3 boats)	Havre	1893	118	13·2	8·7	1	79	1,300	23–24	2–1 prs.	2	21	10
180–187 (8 boats)	Normand, etc.	1894–5	118	13·2	8·6	1	80	1,500	25·7	2–1 prs.	2	21	10
188–191 (4 boats)	Havre, etc.	1893–4	118	13·2	8·6	1	80	1,500	24–2	2–1 prs.	2	21	10
192–194 (3 boats)	Havre, etc.	1894–5	118	13·2	8·	1	82	1,300	23·55	2–1 prs.	2	21	10
195–200 (6 boats)	Havre, etc.	1894–5	319	13·2	8·7	1	80	1,300	23·5	2–1 prs.	2	21	10
201–205 (5 boats)	Normand ..	1897–8	121·4	13·4	8·6	1	84	1,700	25·9	2–1 prs.	2	23	10
206–211 (6 boats)	Bordeaux ..	1897–8	121·4	13·6	8·6	1	86	1,500	23·5	2–1 prs.	2	23	10
212–215 (4 boats)	Normand ..	1899	121·4	13·6	8·6	1	86	1,800	27	2–1 prs.	2	23	10
216–226 (11 boats) ..	Cherbourg, Toulon, etc.	1899–1902	121·6	13·6	8·6	1	86	1,500	23·5	2–1 prs.	2	23	10
227–235 (9 boats)	Bordeaux, etc.	Bldg.	121·4	13·2	8·7	1	86	1,500	23·5	2–1 prs.	2	23	10
236–255 (20 boats) ..	Bordeaux, etc.	Bldg.	121.4	13·2	8·7	1	90	1,500	23·5	2–1 prs.	2	23	10
256–257 (2 boats)	..	1900	124·8	13·2	8·7	1	97	2,000	26·0	2–1 prs.	3	23	10
258–261 (4 boats)	Bordeaux ..	Bldg.	124·8	13·2	8·7	1	97	2,000	26·0	2–1 prs.	3	23	10
262–263 (2 boats)	Creusot ..	Bldg.	124·8	13·2	8·7	1	97	2,000	26·0	2–1 prs.	3	23	10
264–265 (2 boats)	Bordeaux ..	1902	124·8	13·2	8·7	1	97	2,000	26·0	2–1 prs.	3	23	10
266–276 (11 boats) ..	Bordeaux, etc.	1902	124·8	13·2	9·6	1	97	2,000	26·0	2–1 prs.	3	23	10
*277–293 (17 boats) ..	Bordeaux, etc.	Bldg.	124·8	14·0	9·6	1	97	2,000	26·0	2–1 prs.	3	23	10
4 boats	Saigon ..	Bldg.											
SECOND CLASS—													
26	..	1878	108	11	5·6	1	45	400	19	2–1 prs.	2	16	10
27	..	1878	104·4	10·6	6·1	1	44	400	19	2–1 prs.	2	16	10
28	..	1878	111·5	11	5·6	1	44	400	19	2–1 prs.	2	16	10
60–64 (5 boats)	Normand ..	1883	108·2	10·3	6·1	1	45	400	19	2–1 prs.	2	16	10
65, 66, 68 (3 boats) ..	Normand ..	1884	108·2	10·7	6·4	1	49	500	20	2–1 prs.	2	16	10
70–74 (5 boats)	Normand ..	1885	108·2	10·7	6·5	1	50	500	20	2–1 prs.	2	16	10
75–82, 84–87, 89–109 (33 boats)	Cail, etc. ..	1885–92	114·7	10·6	6	1	54	525	20	2–1 prs.	2	16	10
111–125 (11 boats) ..	La Seyne, etc.	1885–90	114·7	10·6	6	1	54	525	20	2–1 prs.	2	16	10
130–132, 134–144 (14 boats)	Normand ..	1890–91	111·5	11·4	6	1	52·8	520	21	2–1 prs.	2	16	10
THIRD CLASS—													
8, 10–16, 18, 19 (10 boats)	Various Firms in France and England.	1877–82	86	10·2	5	1	27	200–450	16–19	..	..	10	
20			87	10·8	5	1	33			..	..	10	
22, 23 (2 boats)			87·6	10·4	5·2	1	30			..	..	10	
24, 25 (2 boats)			88·5	10·4	6	1	30			..	..	10	
31			85·5	10·4	3·8	1	27			..	..	10	
33–36 (4 boats)			89	10·4	6	1	32			..	..	10	
37–40 (4 boats)			87	10·8	5	1	32			..	..	10	
41, 42 (2 boats)			87	10·8	6	1	33			..	..	10	
43, 44 (2 boats)			89	10·4	5·7	1	32			..	..	10	
47			87	10·8	5	1	33			..	..	10	
48			89	10·4	5·8	1	32			..	..	10	
50, 53 (2 boats)			87	10·8	5	1	32			..	..	10	
54, 55 (2 boats)			91	10	6·1	1	32			..	..	10	
VEDETTE BOATS—													
(1 boat) (aluminium) ..	Poplar ..	1894	62·3	9·1	..	1	14	210	20·5	..	1	8	
29, 30 (2 boats)	Chiswick ..	1876	67	8·5	3·5	1	16	..	18	..	1	8	
56, 57 (2 boats)	Chiswick ..	1879	59	7·5	3·5	1	12	50	16	..	1	8	
58, 59 (2 boats)	Chiswick ..	1881	63	7·5	3·5	1	11	50	17	..	1	8	
A–I (9 boats)	Creusot ..	1890–94	62·4	8·9	4·9	1	15	210	16·5	..	1	9	
SUBMARINE—													
Aigrette †	Toulon ..	Bldg.	117·6	12·9	8·3	1	172	200	10·5	..	..	20	..
Algérien	Cherbourg ..	1901	118	9·2	..	1	146	250	8–13	..	..	9	..
Alose	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Anguille	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Bonite	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Castor	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Cigogne †	Toulon ..	Bldg.	117·6	12·9	8·3	1	172	200	10·5	..	..	20	..

* No. 293, Havre (Normand); Parsons turbines, 24 knots. In all, in 1903, 34 boats were ordered—13 of the programme of 1902 and 21 of that of 1903.

† Submersible boats, Laubeuf type.

The Libellule, a turbine-motor vedette torpedo boat, has long been in hand at Havre (F. & C.); delay not explained.

France—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
SUBMARINE—*contd.*			Feet.	Feet.	Feet.		Tons.		Knots				Tons.
Dorade..	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Espadon‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Esturgeon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Farfadet	Rochefort ..	1901	135·8	9 5	9·5	1	185	..	8–12½	..	..	9	..
Français	Cherbourg ..	1901	118	9·9	..	1	146	250	8–13	..	..	9	.
Gnome..	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12½	..	..	9	..
Grondin	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Gustave Zédé	Toulon ..	1893	159	12·4	12·4	1	266	220	5–10	..	1	9	..
Gymnote	Mourillon ..	1888	56·5	5·11	6·0	1	30	55	4–6	..	2	4	..
Korrigan	Rochefort ..	1901	135·8	9·5	9·5	1	185	..	8–12½	..	..	9	..
Loutre	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Ludion	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Lutin	Rochefort ..	1903	135·8	9·5	9·5	1	185	..	8–12½	..	..	9	..
Lynx	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Méduse	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Morse	Cherbourg ..	1899	118	9·0	9·0	1	144	360	8–12·3	..	1	9	..
Naïade	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Narval‡	Cherbourg ..	1899	111·6	12·4	5·4	1	106–206	250	8–12	..	2	9	..
Otarie	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Oursin	Rochefort ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Perle	Cherbourg ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Phoque	Rochefort ..	1903	77	7 6	8·0	1	68	60	8	..	..	5	..
Protée	Cherbourg ..	1902	77	7·6	8·0	1	68	60	8	..	..	5	..
Silure‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Sirène‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Souffleur	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Thon	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
Triton‡	Cherbourg ..	1901	111·6	12·4	5·4	1	106–200	250	8–12	..	2	10	..
Truite	Toulon ..	1903	77	7·6	8·0	1	68	60	8	..	..	5	..
X ‡	Cherbourg ..	Bldg.	122·8	10·2	7 6	2	168	220	10½	..	..	..	..
Y ‡	Toulon ..	Bldg.	142·8	9·10	9·10	1	2 3	250	11	..	..	..	..
Z ‡	Rochefort ..	Bldg.	135·8	9·10	9·10	1	202	190	11	..	..	..	..
Omega	Toulon ..	Bldg.	160·6	13·9	9·0	1	301	330	11	..	2	20	..

‡ Submersible boats. The programme of 1902 included thirteen submarines (Q 38 to Q 42 and Q 61 to Q 68), but only two (38 and 39, Aigrette and Cigogne) were put in hand. Eighteen boats were in the list for 1903 (Q 41 to Q 58), planned with a displacement of 430 tons, of which eight are to be built at Cherbourg and ten at Toulon. In the list for 1904 are sixteen boats (Q 59 to Q 74).

Germany.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
D 1, D 2 (2 boats)	Elbing ..	1887	180·6	21·6	9·8	2	250	1,800	19	6 1-pr. revs.	3	48	50
D 3, D 4 (2 boats)	Elbing ..	1888	184	21·8	9·6	2	300	2,000	20	4 6-pr. Q.F. 2 1-pr. revs.	3	48	96
D 5, D 6 (2 boats)	Elbing ..	1888–9	190·3	23	9·6	2	320	3,000	22½	4 6-pr. Q.F. 2 1-pr. revs.	3	48	90
D 7, D 8 (2 boats)	Elbing ..	1890	190·3	23	9·9	2	350	3,500	22½	6 Q F.	3		
D 9	Elbing ..	1894	197·0	24·3	9 9	2	380	4,500	26	6 Q.F.	3		
D 10	Chiswick ..	1898	211·9	19·6	8·1	2	310	5,800	28·5	5 3-pr. Q.F.	3	52	80
D 11, D 12	Chiswick ..	1900	218·6	20 9	8·7	2	333	7,000	31	1·12 pr. 5·6 prs.	2	59	40
S 90–101	Elbing ...	1900	206·8	22	8·9	2	350	6,000	27·5	3 3-pr. Q.F.	3		
S. 102–107	Elbing ..	1901	203·8	22	8·9	2	350	6,000	27·5	3 3-pr. Q.F.	3		
G 108–113	Kiel(Germania)	1901–2	207·7	22	8·9	2	350	6,000	29·2	3 3-pr. Q.F.	3	49	100
S 114–119	Elbing ..	1903	207·7	22	8·9	2	350	6,000	29·2	3 3-pr. Q.F.	3	49	100
Taku *	Elbing ..	1898	193·7	21·0	..	2	280	6,000	35	6·3 prs.	2	..	67
FIRST CLASS—													
S 1—S 40 (40 boats) S 42—S 65 (24 boats)	Elbing .. Elbing ..	1883–92	121 150	15·7 15·6	6·7 6·7	..	85–88	900 1,600	20–22½	2 1-pr. revs.	2	..	17
S 66—S 73 (8 boats)	Elbing ..	1893	154·3	16·4	..	2	110 145	1,600	..	..	3		
S 74—S 81 (8 boats)	Elbing ..	1894	154·3	16·4	..	2	125	1,900	25	..	3		
S 82—S 87 (6 boats)	Elbing ..	1897–8	158·2	16·9	9·0	2	140	2,300	26	2 1-pr. revs.	3	..	32
G 88—G 89 (2 boats)	Kiel(Germania)	1898	154·3	16·5	..	..	160	2,500	26	2 mach.	3	22	
V 1, V 2 (2 boats) V 3, V 4 (2 boats) V 5—V 10 (6 boats)	Stettin .. Stettin .. Stettin ..	1884 1884 1884	124·6	.. .. ..	.. .. ..	.. .. ..	75 90	550 1,000	 19	.. .. ..	2 2 2		
G 1,	Gaarden ..	1885	124·6	15·7	6·6	..	88	1,000	19	2 1-pr. revs.	2	17	
Y 1,	Poplar ..	1884	120	12·5	5·5	1	65	650	19	2 1-pr. revs.	2	15	25
T 1, T 2 (2 boats)	Chiswick, &c.	1884	117·7	12·5	6·2	1	80	..	20	2 1-pr. revs.	2	15	22
H 1,	Kiel (Howaldt)	1886	..	..	..	..	80	1,000	20·2	2 1-pr. revs.	2		
K 1,	Kiel(Dockyard)	1887	118·1	13·4	5·9	..	85	1,000	22	2 1-pr. revs.	..	13	
SECOND CLASS—													
3 boats	..	1893	..	..	..	..	88	..	22				
2 boats	..	1893	..	..	..	..	90	..	23				

* Ex Hai Ying, captured from the Chinese at Taku, 1900.

The Estimates of 1904 provide the final expenditure for the building of a division of torpedo boats and the initial outlay for a second division. Two submarine boats of the Holland type are completing; a small Howaldt boat has been built, and two others of special type are proposed. There are three Nordenfelt submarines, launched 1890-91.

Greece.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
6 boats	Stettin ..	1885	128	15·3	5·4	1	85	1,050	19	4 1-pr. revs.	..	20	20
6 boats	Poplar.. ..	1881	100	12	4·2	1	48	600	19	2 1-pr. revs.	2	12	9
4 boats	La Seyne ..	1880	72	13	5·5	1	52	225	..	..	..	..	10
5 boats	La Seyne ..	1881	89	11	3·1	1	35	500	17·5	..	..	..	5

Italy.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Fulmine	Sestri (Odero)	1898	200	20·4	5·4	2	298	4,800	28	1 12-pr. 3 6-pr. Q.F.	3	43	60
Lampo Freccia Dardo Strale Euro Ostro	Elbing (Schichau)	1899 1901	196·8	21·3	5·8	2	320	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	60
Nembo Turbine Aquilone Borea Meteoro Tuono	Naples (Pattison)	1901 1902	208	19·4	6·3	2	330	6,000	30	1 12-pr. Q.F., 5 6-pr.	2	53	66
Zefiro Espero	..	Bldg.	208	19·4	6·3	2	330	6,000	3?	1 12-pr. Q.F., 5 6-pr.	2	c3	60
FIRST CLASS—													
5 boats: Aquila, Sparviero, Nibbio, Avvoltoio, Falco	Elbing ..	1888	152	17·2	7·9	2	130	2,200	26·6	2 3-pr. Q.F., 1 1-pr. Q.F., 1 1-pr. rev.	3	24	40
Nos. 78, 79 (2 boats)	Venice ..	1887	135	14	5·3	2	110	1,600	24	1 1-pr. Q.F., 1 1-pr. rev.	3	20	24
Pellicano	Sestri (Odero)	1899	157·4	19	14·8	2	147	2,700	25	2 3-prs.	2	28	24
Condore	Sestri(Ansaldo)	1898	154·3	16·8	6·9	2	136	2,500	27	2 3-prs.	2	27	16
SECOND CLASS—													
Nos. 76, 77 (2 boats)	Poplar.. ..	1887	140	14	5	2	100	1,600	25	2 3-pr. Q.F., 1 1-pr. rev.	4	20	24
Nos. 78, 79 (2 boats)	Venice ..	1896	..	..	..	..	..	..	..	..	3	20	24
Nos. 80–104, 106–111 (31 boats)	Elbing and Italy ..	1887–88	127·7	15·6	6·8	1	85	1,000	22·5	2 1-pr. Q.F	2	17	17
Nos. 112-116, 118-135 (23 boats)	Elbing and Italy ..	1889–92	127·7	15·6	6·8	1	85	1,100 1,200	23	..	2	17	17
No. 117	..	1895	131·2	16·4	..	1	85	1,000	..	2 1 pr. Q.F.	2	17	17
Nos. 136–146 (11 boats)	Italy	1893-94	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 147–153 (7 boats)	Italy ..	1894–5	131·2	16·4	..	1	85	1,000	22	2 1-pr. Q.F.	2	17	17
Nos. 60–75 (15 boats)	Elbing and Italy ..	1885–87	127·7	15·6	6·8	1	65	1,000	22·5	2 1-pr. Q.F.	2	17	17
THIRD CLASS—													
No. 22	Poplar.. ..	1882	100	12·5	5·5	1	40	620	22	1 1-pr. rev.	2	11	7
No. 25	Poplar.. ..	1882	100	12·5	5·5	1	40	620	22	1 1-pr. rev.	2	11	7
Nos. 26–59 (34 boats)	Chiswick and Italy ..	1882–86	100	11·7	5·3	1	34	430	21·3	1 1-pr. rev.	2	11	7
Nos, 23, 24 (2 boats)	Chiswick ..	1881	92	10·5	4·9	1	33	470	21·8	1 1-pr. rev.	2	11	7
FOURTH CLASS.													
No. 1	Chiswick ..	1878	78·8	9·8	3	1	19	173	19	..	2	10	
No. 2	Poplar.. ..	1879	86	11	4·5	1	25	420	21	1 1-pr. rev.	2	10	
No. 18	Chiswick ..	1883	62·4	7·5	2·5	1	10	170	17	1 1-pr. rev.	2	10	
No. 11	Leghorn ..	1883	75·6	9·9	3·8	1	31	250	19·2	..	2	10	
SUBMARINE—													
Delfino	Spezia.. ..	1894	78·6	10·1	..	1	111	150	10–12	..	2	12	
Tritone	Spezia.. ..	1902	58·8	..	..	1	..	..	8·5	..	..	5	

The new Italian destroyers have Thornycroft water-tube boilers.

The submersible boat, Glauco, is in hand at Venice, to have a surface speed of 14 knots and a range of 2,000 miles, and another boat of the type is to be built. A smaller submarine, designed by Signor Laurent°, is completing, and five others ɛre proposed.

Japan.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
DESTROYERS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Murakumo	Chiswick ..	1898	210·0	19·5	7·2	2	285	5,800	30 to 30·55	1 12-pr., 5 6-prs.	2	54	80
Shinonome	Chiswick ..	1898											
Yugiri	Chiswick ..	1898											
Shiranui	Chiswick ..	1899											
Kagerou	Chiswick ..	1899											
Usugumo	Chiswick ..	1900											
Shirakumo	Chiswick ..	1901	216·7	20·7	8·3	2	..	7,400	31	1 12-pr., 5 6-prs.	2	59	96
Asashio	Chiswick ..	1902											
Ikadsuchi	Poplar.. ..	1898	220·0	20 6	9·6	2	400	6,000	31·03 to 31·38	1 12-pr., 5 6-prs.	2	55	95
Inadsuma	Poplar.. ..	1899											
Akebono	Poplar.. ..	1899											
Sazanami..	Poplar.. ..	1899											
Oboro	Pop'ar.. ..	1899	220·3	20·6	9·6	2	307	6,000	31 62	1 12-pr., 5 6-prs.	2	..	90
Niji	Poplar.. ..	1899	220·3	20.6	9·6	2	303	6,000	31 15	1 12-pr., 5 6-prs.	2	..	90
Kasumi .. .. .., Akatsuki	Pop'ar.. ..	1902	220·3	20·6	9·6	2	320	6,000	31	1 12-pr., 5 6-prs.	2	..	..
Harusame	Yokosuka ..	Bldg.	220·3	20·6	9·6	2	320	6,000	31	1 12-pr., 5 6-prs.	2	..	..
Murasame	Yokosuka ..												
Hayatori	Yokosuka ..												
Asagiri	Yokosuka ..												
FIRST CLASS—												..	
Kotaka	Poplar.. ..	1886	170	19·6	5		190	1,400	19	4 mach.	6		
Hayabusa..	Normand ..	1898	147·7	16·0	8 2	2	150	4,200	30	3 3-prs.	3		13
Kasasagi	Normand ..	1899											
Manadzuru	Normand ..	1899											
Chidori	Normand ..	1900											
Shirataka..	Elbing ..	1899	..	..	..	..	125	..	28	..	..	..	..
Aoataka	Kure	Bldg.	..	..	..	..	120	..	..	..	..	..	..
Hato	Kure	Bldg.	..	..	..	..	120	..	..	..	..	..	..
Hibari	Kure	Bldg.	..	..	..	..	120	..	..	..	..	..	..
Kari	Kure	Bldg.	..	..	..	..	120	..	..	..	..	..	..
Kiji	Kure	Bldg.	..	..	..	..	120	..	..	..	..	..	..
Tsubame	Kure	Bldg.	..	..	..	..	120	..	..	..	..	..	..
Hashitaka	Kawasaki ..	Bldg.	..	..	..	..	150	..	..	..	..	..	..
Kamone	Kure	Bldg.	..	..	..	..	150	..	..	..	..	..	..
Otori	Kawasaki ..	Bldg.	..	..	..	..	150	..	..	..	..	..	..
Sa i	Kure	Bldg.	..	..	..	..	150	..	..	..	..	..	..
Uzuri	Kure	Bldg.	..	..	..	..	150	..	..	..	..	..	..
Fukuriu	Kiel	1895	..	..	..	..	115	..	..	..	..	..	..
SECOND CLASS—													
2 boats*	Kobe	1901	..	..	..	..	83	..	..	..	..	..	..
10 boats	Poplar.. ..	19 0	152·6	15·3	7·9	..	..	1900	27	2 3-prs	3	..	36
16 boats	Elbing ..	1891–9	..	..	..	..	..	..	..	..	..	..	..
13 boats	Creusot ..	1889	114·7	10·6	6	2	56	525	20	2 1-prs.	..	16	50
7 boats	Kobe	1889	114·7	10·6	6	1	56	525	20	2 1-prs.	..	16	
4 boats	Poplar.. ..	1879	100	12·5	..	1	40	620	20	..	..	..	
1 boat (No. 24) ..	Normand ..	1891	118	13·1	6·9	1	80	1,200	23	2 1-prs.	2	21	10
2 boats	Normand ..	1898	121·4	13·6	8·6	1	86	1,800	27	1 3-pr.	2	..	10

* Materials sent out by Schichau (Nos. 60 and 61).

Mexico.

Mexico has four first-class boats building or projected.

Norway.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet		Tons.		Knots.				Tons
Lyn	..	1882	94·2	9·7	2·5	1	36	430	18	..	1	..	3
Od	..	1882	97·5	11	5·6	1	40	450	18	..	1	..	3
Orm, Otter (2 boats)	..	1887	108·2	12·2	5·6	1	40	500	20	..	2	..	3
Pil, Rask (2 boats)..	..	1887	101·7	11·8	5·6	1	40	500	20	..	2	..	3
Snar	..	1887	104·9	11·8	5·6	1	40	500	20	..	2	..	
Springer	..	1887	97·5	11·6	5·6	1	40	450	19	..	2	..	
Varg (8), Raket (9)	Christiania..	1894	111·5	12·4	..	1	43	..	..	..	2	..	..
Hval, Delfin, Hai (3 boats)	Elbing ..	1896	128·0	15·0	6·9	1	84	1,100	24·5	2 1·4-in. Q.F.	2	..	..
Storm, Brand, Trods	Christiania ..	1899	128·0	15·0	..	1	84	1,100	23	2 1·4-in. Q.F.	2		
Laks, Sild, Sael, Skrei	Christiana ..	1900	128·0	15·0	6·9	1	84	11,000	23	2 1·4-in.	2	..	..
Kjeck, Hvas, Dristig, Kvik, Djerv, Blink, Glint	Christiana ..	1898 1900	111·5	14·5	6 3	1	65	650	19	2 1·4-in.	2	..	..
SECOND CLASS—													
Rasp	Chiswick ..	1873	58	7·5	3·9	1	16	..	18	..	2		
Ulven	..	1878	56	..	..	1	16	..	9	..	sp.		
2 boats	..	Bldg.	..	..	..	..	20	..	12	..	..		

A submarine boat of the Holland type is to be bought. Two small torpedo boats are in hand.

Netherlands.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Ardjoeno	Poplar.. ..	1886	125	13	6	1	83	80	21	2 1-prs.	2	16	10
Batok	Amsterdam	1887	125	13	6·9	1	83	725	20	2 1-prs.	2	16	10
Cycloop	Amsterdam	1887	125	13	6·9	1	83	680	20	2 1-prs.	2	16	10
Dempo	Amsterdam	1887	125	13	6·9	1	83	760	20	2 1-prs.	2	16	10
Empong	Poplar.. ..	1888	128	13	6·2	1	91	1,100	24·1	2 1-prs.	3	16	15
Etna	Poplar.. ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Foka	Amsterdam	1888	128	13	6·2	1	90	1,000	22·1	2 1-prs.	3		
Goentoer	Amsterdam	1888	128	13	6·2	1	90	950	21	2 1-prs.	3		
Habang	Amsterdam	1888	128	13	6·2	1	90	930	21·7	2 1-prs.	3		
Hekla	Poplar.. ..	1882	100	12·6	5·6	1	45	550	21·5	2 1-prs.	2	16	7
Idjen	Amsterdam	1889	128	13	6·2	1	90	840	20·6	2 1-prs.	3		
Krakatau	Amsterdam	1889	128	13	6·2	1	90	750	19·1	2 1-prs.	3		
Lamongan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Makjan	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Nobo	Amsterdam	1890	104·5	13·3	5·2	1	50	790	20·7	2 1-prs.	2		
Scylla	Poplar.. ..	1900	130	13·6	6·0	1	77	1,200	24.3	2 1-prs.	3	18	20
Hydra	Poplar.. ..	1900	130	13·6	6·0	1	77	1,200	24·4	2 1 prs.	3	18	20
Ophir	Poplar.. ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Pangrango	Poplar.. ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Rindjani	Poplar.. ..	1901	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Smeroe	Fijenoord ..	Bldg.	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Tangka	Fijenoord ..	Bldg.	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Wajang	Fijenoord ..	Bldg.	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Minotaurus, Python	Flushing ..	Bldg.	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
Sphinx and another..	Flushing ..	Bldg.	152·6	15·3	7·9	1	130	1,900	27	2 3-prs.	2	25	36
SECOND CLASS—													
Nos. 1, 2, 4–20 (19 boats)	Chiswick, etc.	1878–86	76 / 79	10·3	5·2	1	29	250	18	1 1-pr.	2 sp	..	3
Nos. 3,21,2 (3 boats)	..	1890	83·6	10·5	5·1	1	37	460	17·9	1 1-pr.	1	..	3
1 boat	East Cowes	1883	45·5	9·7	..	1	..	..	12	1 mach.	1		
INDIAN FLEET—													
Cerberus	Flushing ..	1888	125	13	6·9	1	83	912	21·2	2-1 prs.	..	16	
1 boat	..	1891											
3 boats	..	1893–94	125	..	..	..	83	..	21·5	..	2		

All the Poplar destroyers have Yarrow water-tube boilers, and the later ones are fitted for the consumption of oil fuel.
One submarine boat (Holland type) to be purchased.

Portugal.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
5 boats (5–9)	Elbing ..	1890–92											
Espadarte (1)	Poplar.. ..	1881	85	11	5	1	31	450	19·7	2 mach.	2	10	10
Nos. 2, 3, 4 (3 boats)	Poplar.. ..	1886	120	12·5	5·5	1	60	700	20	2 mach.	2	16	18
Fulminante	Blackwall ..	1880	75	15	2·6	2	40	150	11·5	2 mach.	..	..	8
Mineiro	Lisbon ..	1893	..	..	..	..	..	..	12				
SUBMARINE—													
Plongeur	Lisbon ..	1892	72·1	11·5	..	..	100	..	6		4	6	

Roumania.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
FIRST CLASS—			Feet.	Feet	Feet.		Tons.		Knots.				Tons.
Naluka	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Sborul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
Smeul	Havre	1888	120·7	11·3	6·9	1	56	578	21	1 1-pr. rev.	2	..	12
SECOND CLASS—													
Soimul	Poplar.. ..	1882	63	8	3	1	12	150	16·5	..	..	8	1
Vulturul	Poplar.. ..	1882	63	8	3	1	12	150	16·5	..	..	8	1

Russia.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
BALTIC SEA.			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Prytki	Poplar.. ..	1895	190	18·6	7.0	2	240	4,400	29.7	1 12-pr. 3	2		
Revy, Retivy, Ryany, Rezviyi, Prosorlivy, Piliky, Poslusny, Prostny, Poratsaiuschy, Prontsiteliny, Podvitsny	Abo, Ishora & Nevsky ..	1898	196·9	18·4	11·5	1	240	3,800	27	1 12-pr, 3 3-pr	2	55	53
Buistni, Bedovi, Bravi, Blestiaschy, Bezumprechni, Bodry Bystri, Vidny* ..	Nevsky and Ishora ..	1900–2	196·9	18·4	11·5	1	350	6,000	28	1 12-pr, 5 3-pr			
Gromki, Grozni, Gromiashtchi ..	St. Petersburg	Bldg.											
3 boats	Abo	Bldg.											
FIRST CLASS—													
Aspen	Ishora.. ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Abo	Elbing ..	1886	128	15·7	7·5	1	87	900	22·2	4 1-pr. revs.	2	13	17
Bjerke	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Dago	Abo	1891	152	13	8·3	..	100	1,000	19				
Domeness	Putiloff ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Eckness	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Hapsal	Putiloff ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Hogland	Ishora.. ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Kotka	Abo	1891	152	13	8·3	..	100	1,000	19				
Kotlinj	St. Petersburg	1885	124·2	12·9	5·9	2	67	500	16·5	2 1-pr. revs.	2	16	15
Kronschlot	Ishora.. ..	1891	152	13	8·3	..	100	1,000	19				
Lachta	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Libawa	Elbing ..	1886	128	15·7	7·5	1	87	1,000	22	4 1-pr. revs.	2	13	17
Louga	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Moonsund	Putiloff ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Nargen	Ishora.. ..	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Narwa	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Pernoff	Normand ..	1892	137·9	14·9	6·8	2	120	1,600	25	2 3-prs.	2	26	16
Rochensalm	Putiloff ..	1890	136·5	13	7·8	..	81	1,100	21				
Seskar	Ishora.. ..	1891	152	13	8·3	..	100	1,000	19				
Sestoretsk..	Normand ..	1894	118	13·2	8·6	1	80	1,300	24	2 1-prs.	2	21	10
Tosna	Putiloff ..	1893	127·9	15·7	6·9	1	98	1,250	21	..	2	13	17
Transund	Ishora.. ..	1895	127·9	15·7	6·9	1	98	1,250	21	..	2	..	17
Viborg	Clydebank ..	1886	144·5	17	8·1	2	126	1,400	20	2 3-pr. revs.	3	24	45*
Vindawa	Elbing ..	1886	128	15·7	7·5	1	87	900	21	4 1-pr. revs.	2	13	17
Vzriw	St. Petersburg	1877	118	16	10·9	1	160	800	14·5	4 Q.F.	1	18	16
8 boats	St. Petersburg	1894	128	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
2 boats	Putiloff ..	1894	138	14·7	9·9	2	118	..	25	2 mach.	2	26	
2 boats	St. Petersburg	1896	128	16	6·9	2	85	1,200	22	2 1-prs.	2	13	17
6 boats	St. Petersburg	1897	138	14·7	9·9	2	120	..	25	..	2	26	
8 boats	Nevsky ..	1898	..	..	..	..	118						
SECOND CLASS—													
21 boats (Galka class)	Elbing and Russia ..	1880 &c.	74·7	8·9	5	1	30	220	16	..	2	14	3
21 boats (Woron class)	Elbing and Russia ..	..	66	11·1	..	1	..	260	17				
1 boat	Poplar.. ..	1888	60	8·5	3	1	16	240	17·5	..	2	..	1
BLACK SEA.													
DESTROYERS—													
Zavidni, Zavetni, Zharki, Zhutki, Zhivoi, Zhivulka	Nicolaieff ..	1903 & Bldg.	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2		
Stremitelini, Strogi, Smetlivy, Svirepy†	Abo	1901	190·4	18·5	11·5	2	240	3,800	27	1 12-pr, 3 3-pr	2	..	60
Zadorni, Zorki, Zvonki	Nicolaieff ..	1903	210	21·2	7	2	350	5,500	27	1 12-pr, 5 3-pr	2		
FIRST CLASS—													
A. B. C. (3 boats) ..	Nicolaieff ..	1893	126	..	..	..	81	..	21				
Adler..	Elbing ..	1890	152·0	17·2	7·9	2	130	2,200	27·4	2 1-prs.	3	24	40
Anakria	Elbing ..	1890	128·0	16	6·9	1	85	1,200	22	2 1-prs.	2	13	17
Anapa	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Aitodorj	Odessa.. ..	1891	126	13	8·5	1	81	1,100	21	2 1-pr. revs.	2	13	
Batoum	Poplar.. ..	1880	100	12·5	5·5	1	40	500	22	2 1-pr. revs.	2	12	9
D. E. (2 boats) ..	Sebastopol ..	1893	128	..	..	..	85	..	22				
Gagri	Claparède ..	1883	120·6	13·3	7	1	78	600	18	2 1-pr. revs.	2	13	12
Gelendshik	La Seyne ..	1883	122·7	12·4	6·2	1	73	560	18	2 1-pr. revs.	2	13	11
Ismail	Nicolaieff ..	1886	128	15·7	7·5	1	87	900	20	2 1-pr. revs.	2	13	17
Itzvar	Odessa.. ..	1891	..	..	..	..	81	1,100					
Kodor	Elbing ..	1886	128	15·7	7·5	1	87	900	21	4 1-pr. revs.	2	13	17
Kilia..	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Novorossisk	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Poti	Normand ..	1883	124·8	11·0	7·0	1	62	550	18	2 1-pr. revs.	2	13	
Reni	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
Sookhoum	Chiswick ..	1883	113	12·5	6	1	64	700	19.5	2 Nords.	2	13	10
Tchardak	Elbing ..	1886	128	15·7	7·5	1	87	900	20	4 1-pr. revs.	2	13	17
Yalta..	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
3 boats	Elbing ..	1886	128	15·7	7·5	1	87	900	22	4 1-pr. revs.	2	13	17
4 boats	Nicolaieff ..	Bldg.	..	..	..	..	..	..	..	..	..	..	..

Twelve sea-going torpedo-boats to be built in German yards.

* Seven of these were outward bound to Port Arthur when the war broke out, and were ordered to return.

† These destroyers proceeded from Cronstadt to Sebastopol, unarmed, January, 1903, passing the Dardanelles by consent of the Porte.

A small submarine boat from the plans of Lieut. Kolbasieff and Engineer Kuteinikoff has received the name of Matros Pietr Koschka. Bubnoff's submarine (77 ft., 175 tons) is reported to have made a successful run of 36 hours from Kronstadt to Bjoerkoe, 26 hours submerged. It is stated that six more are to be built. There are two submersibles, 80 ft. long, designed by Drzewiecki.

Russia—*continued.*

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
BLACK SEA—*contd.*													
SECOND CLASS—													
Istcheritza	Sebastopol ..	1878	62·3	9·7	3·9	1	24	220	15	..	..	10	
Karabin	Elbing.. ..	1877	64·3	8·4	2	1	11	120	15	..	..	8	
Kefal..	Chiswick ..	1880	60·5	7·5	3·5	1	..	..	16·8	..	..	8	
Scheglensk	Sebastopol ..	1878	59·3	9·5	3·9	1	24	220	15	..	..	10	
Schehouka	Sebastopol ..	1878	59·3	9·5	3·9	1	24	220	15	..	..	10	
Scoombia	Odessa.. ..	1878	61·3	10	4	1	25	220	15	..	..	10	
Soroka	St. Petersburg	1878	62·3	9·7	3·9	1	24	220	15	..	..	10	
Soulin	..	1877	60	9·7	3·9	1	24	210	15	..	..	10	
Sultanka	Odessa.. ..	1878	64·3	10	4	1	25	220	15	..	..	10	
1 boat	Poplar	1877	75	10	..	..	..	..	..	..	..	..	
50 boats(WoronClass)	Elbing, etc.	..	66	11·1	..	1	..	260	17				
3 boats	Nicolaieff ..	1898											
FAR EAST.													
DESTROYERS—													
Bditelni, Bespochtchadni, Bestrachni, Beschumni (4 boats)	Elbing ..	1899	196·9	18·4	11·5	1	350	6,000	27	1 12-pr,5 3-pr	2		
Boevoi	Birkenhead	1899	213	21·5	12·9	1	370	6,000	28				
Grozovoi, Vlastni ..	Havre (F. & C,)	1900–2	186·0	20·8	10·3	2	300	5,000	28	1 12-pr,5 3-pr	2	..	80
Boiki, Burni	Nevsky and Ishora ..	1900–2	196·9	18·4	11·5	1	350	6,000	28	1 12-pr,5 3-pr			
Vnushitelni*	Havre (F.&C.	19:0–2	186·0	20·8	10·3	2	300	5,000	27	1 12-pr,5 3-pr	2	..	80
Vnimatelni, Vuinoslivni	Havre (Normand) ..	1900–1	186·0	20·8	10·3	2	300	5,000	27	1 12-pr,5 3-pr	2	..	80
Silni, Serdity, Smely, Storosevoi, †Steregustchi, ‡Skory, **Strashni, Stroini, Stratni, Riesitelini, Ratsiastchi, Ratstoropny	Port Arthur	1902 / 1893	190·3	18·9	11·6	2	:50	3,8 0	26	1 12-pr,3 3-pr	2	..	..
Lieut. Burukoff§ ..	Elbing ..	189:	193·7	21·0	..	2	280	6,000	35	6 3-pr. Q.F.	2	..	67
Borgo	Abo	1890	136·5	13	7·8	..	81	1,100	21				
Forel..	..	..	71·5	6·5	3·3	1	23	220	16				
Jantchiche	Elbing.. ..	1887	128	15·7	11·5	..	87	970	19	4 1-pr. revs.	2	13	17
N.	..	1893	152·5	16·8	..	..	140	2,200	26·5	2 1-pr. revs.	3	24	40
N.	..	1893	152·5	16·8	..	..	140	2,200	26·5	2 1-pr. revs.	3	24	40
Podorosnik	..	..	71·5	6·5	3·3	1	23	220	16				
Revel	Normand ..	1886	151	12·5	8·4	1	102	800	20	2 1-pr. revs.	2	23	15
Sisik	..	..	71·5	6·5	3·3	1	23	220	16				
Skorpion	..	..	71·5	6·5	3·3	1	23	220	16				
Sootchena	Elbing.. ..	1887	128	15·7	11·5	..	87	970	19	4 1-pr. revs.	2	13	17
Sterliad	..	..	71·5	6·5	3·3	1	23	220	16				
Strauss	..	..	71·5	6·5	3·3	1	23	220	16				
Sunguri (*ex* Hogland)	Abo	1890	152	16	7·9	2	140	1,800	22				
Sweaborg	Normand ..	1886	151	12·5	8·4	1	102	800	20	2 1-pr. revs.	2	23	15
Ussuri (*ex* Nargen)	Abo	1890	152	16	7·9	2	140	1,800	22				
2 Unnamed	Ochtenski ..	Bldg.	152	16	7·9	2	140	1,800	22				

* Vnushitelni destroyed in Pigeon Bay, February 25, 1904. † Steregustchi sunk in action off Port Arthur, March 11.
‡ Skory sunk by fouling a mine, March 16. § Captured from the Chinese at Taku, 1900.
** Strashni sunk at Port Arthur.

Spain.

Name or Number.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
DESTROYERS—													
Terror	Clydebank ..	1896	220	22	5·6	2	300	6,000	28	2 12-pr. 2 6-pr. 2 1-pr.	2	67	100
Audaz, Osado, Proserpina	Clydebank ..	1897	225	25·6	5·8	2	400	7,500	30	2 14-pr. 2 6-pr. 2 1-pr.	2	70	90
FIRST CLASS—													
Acevedo	Chiswick ..	1885	117·7	12·5	6·2	1	63	660	20·1	2 mach.	2		
Arriete	Chiswick ..	1887	147·5	14·6	4·9	2	97	1,600	26·1	4 3-pr. Q.F.	2	..	25
Azor	Poplar.. ..	1887	134·5	14	6	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
Bustamente	Normand ..	1887	126	10·9	..	..	63	800	..	3 3-prs.	2		
Habana	Chiswick ..	1887	127·5	12·5	6	1	59	730	21·3	1 mach.	2		
Halcón	Poplar.. ..	1887	134·5	14	..	1	108	1,600	24	4 3-pr. Q.F.	3	23	25
Julian Ordoñez ..	Chiswick ..	1885	117·7	12·5	6·2	1	65	660	20·1	2 1-in. Nord.	2		
Orion..	Gaarden ..	1885	125	15·5	3·5	1	85	1,000	21·5	2 1-pr. revs.	2	18	16
Rayo..	Chiswick ..	1887	147·5	14·6	4·9	2	97	1,600	25·5	4 3-pr. Q.F.	2	..	25
Barceto	..	1886	117·7	12·5	6·2	1	63	660	20	2 mach.	2		
VEDETTE BOATS—													
3 boats	East Cowes	1892	60	9·3	..	..	..	..	18·3				
SUBMARINE—													
Peral..	Carraca ..	1889	70	8·5	..	2	87	60	10				

Sweden.

Torpedo Boats.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
Destroyer—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Mode	Poplar.. ..	1902	220·3	20 6	8·9	2	400	6,800	32·4	1 12-pr. 5 6-prs.	2	55	95
First Class—													
Komet	Elbing ..	1896	128	15·9	6·11	1	92	1,056	23·0	2 1·9-in. Q.F.	2	16	17
Blixt..	Carlskrona..	1898	128	15·9	6·11	1	92	1,260	23·5	2 1·9-in. Q.F.	2	18	17
Meteor	Carlskrona..	1899	128	15·9	6·11	1	92	1,330	23·8	2 1·9-in. Q.F.	2	18	17
Stjerna	Carlskrona..	1899	128	15·9	6·11	1	92	1,250	23·4	2 1·9-in. Q.F.	2	18	17
Orkan	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Vind..	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Bris	Carlskrona..	1900	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Virgo	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Mira..	Carlskrona..	1902	128	15·9	6·11	1	92	1,250	23·5	2 1·5-in. Q.F.	2	18	17
Orion .. .. .. / Sirius .. .. .. / Capella	Carlskrona..	Bldg.	128	15·9	6·11	1	92	1,250		2 1·5-in. Q.F.	2	18	17
No. 1..	Chiswick ..	1884	113·2	12·2	6·3	1	65	620	18·5	1 mach.	2	16	11
2 boats (3 and 5) ..	Stockholm ..	1887	114·2	12·6	6·7	1	67	620	18·5	1 mach.	2	16	15
No. 7..	Stockholm ..	1887	114·2	12·6	6·7	1	67	620	18·7	1 mach.	2	16	15
2 boats (9 and 11) ..	Carlskrona..	1894	126·8	13·11	7·7	1	86	850	19·5	2 mach.	2	16	15
Second Class—													
No. 61	Stockholm ..	1882	91·6	11·8	5·7	1	40	350	16·0	1 mach.	1	14	9
No. 63	Chiswick ..	1883	100·1	11·10	5·11	1	45	420	19·0	1 mach.	2	14	7
No. 65	Stockholm ..	1885	100·1	11·10	5·11	1	45	420	19·0	1 mach.	2	14	9
No. 67	Stockholm ..	1886	100·9	11·10	6·1	1	46	430	19.2	1 mach.	2	14	9
No. 69	Stockholm ..	1886	100·9	11·10	6·1	1	46	450	19·9	1 mach.	2	14	9
No. 71	Stockholm ..	1887	103·4	11·10	6·7	1	58	460	18·6	1 mach.	2	14	9
No. 73	Stockholm ..	1887	103·4	11·10	6·7	1	58	460	18·6	1 mach.	2	14	9
No. 75	Stockholm ..	1892	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 77	Carlskrona..	1891	100·5	11·6	6·3	1	49	460	18·9	1 mach.	2	14	9
No. 79	Stockholm ..	Bldg.	101·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
No. 81	Stockholm ..	Bldg.	101·0	12·5	6·1	1	49			1 1·5-in. Q.F.	2	14	
Third Class—													
Nos. 141, 143, 145, 147, 149 (5 boats) ..	Stockholm ..	1879 / 1890	55·0	10·7	4·1	2	21	80	10	..	2	..	1·5
Submarine—													
Enroth	Stockholm ..	1902	[illegible]·0	13·0	11·6	2	146	100	12 11	..	1	..	..
Hajen	Stockholm ..	1903	65·0	11·6	..	..	120	200	10–7	..	..	..	..

One first-class and two second-class boats were to be completed in 1903.

Turkey.

Name or Number.	Where Built.	Launched.	Dimensions.			Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament.	Torpedo Tubes.	Complement.	Coal Capacity.
			Length.	Beam.	Draught.								
Destroyers—			Feet.	Feet.	Feet.		Tons.		Knots.				Tons.
Berk-Efshan	Gaarden ..	1894	187	21·6	..	2	270	1,200	25	6 1-pr. revs.	2		
Tajjar	Gaarden ..	1894	187	21.6	..	2	270	..	25	6 1-pr. revs.	2		
First Class—													
2 boats	Sestri Ponente	1901	165·8	18·6	4·5	..	165	2,200	24				
6 boats	Sestri Ponente	Bldg.	165·8	18·6	4·5	..	165	2,200	24				
A. B...	Sestri Ponente	1901	166	18·6	4·0	2	145	2,400	26	2·1 pr.	2	..	16
Edjder (No. 10) ..	Gaarden ..	1890	152·7	18·9	7·4	2	150	2,200	23	5 3-prs. Q.F.	2		
1 boat	Constantinople	1889	140	16	6·9	2	120	1,800	23	5 1-pr. revs.	2		
5 boats	Gaarden ..	1889–90	126·7	15·4	8·6	1	85	1,300	22	2 1-pr. revs.	2	21	8
Timsah	London ..	1887	126	15	..	..	..	..	21·7				
5 boats	Elbing ..	1886	120·3	16·2	..	..	85	900	21	2 Nords.	2	20	10
4 boats	Constantinople	1886–89	100·3	11·8	5·5	1	42	550	19·5	2 mach.			
Tewfik	Normand ..	1885	100·7	13	5·5	1	42	550	20				
2 boats	La Seyne and Constantinople	1885	100·7	13	5·5	1	42	550	20·3	2 Nords.			
2 boats	Teddington	1887	124	15	..	..	..	..	22				
2 boats	Kiel	1892	127	..	..	..	..	..	22				
Submarine—													
Abdul Hamid	Chertsey ..	1886	100	12	..	3	160	250	10	2 mach.	1	..	8
Abdul Medjid	Chertsey ..	1886	100	12	..	3	160	250	10	2 mach.	1	..	8

United States.

Name.	Where Built.	Launched.	Dimensions. Length.	Beam.	Draught.	Number of Screws.	Displacement.	Indicated Horse-Power.	Maximum Trial Speed.	Armament. Guns.	Torpedo Tubes.	Complement.	Maximum Coal Capacity.
DESTROYERS—			ft. in.	ft. in.	ft. in.		Tons.		Knots.				Tons.
Bainbridge ..	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.*	2	64	139
Barry	Philadelphia	1902	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	139
Chauncey.. ..	Philadelphia	1901	245 0	23 7	6 6	2	420	8,000	29	2 12-pr., 5 6-pr.	2	64	139
Dale	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 12-pr., 5 6-pr.	2	64	139
Decatur	Richmond ..	1900	245 0	23 7	6 6	2	420	8,000	28	2 12-pr., 5 6-pr.	2	64	139
Hopkins	Wilmington	1902	244 0	24 6	6 0	2	408	7,200	29	2 12-pr., 5 6-pr.	2	64	150
Hull	Wilmington	1902	244 0	24 6	6 0	2	408	7,200	29	2 12-pr., 5 6-pr.	2	64	150
Lawrence.. ..	Quincy, Mass.	1900	242 3	22 3	6 2	2	400	8,400	30	2 12-pr., 5 6-pr.	2	64	115
Macdonough ..	Quincy, Mass.	1901	242 3	22 3	6 2	2	400	8,400	30	2 12-pr., 5 6-pr.	2	64	115
Paul Jones ..	San Francisco	1900	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Perry	San Francisco	1900	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Preble	San Francisco	1901	245 0	23 7	6 6	2	420	7,000	29	2 12-pr., 5 6-pr.	2	64	139
Stewart	Morris Heights	1902	245 0	23 7	6 6	2	420	8,000	29·3	2 12-pr., 5 6-pr.	2	64	139
Truxtun	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Whipple	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Worden	Baltimore ..	1901	248 0	23 3	6 0	2	433	8,300	30	2 12-pr., 5 6-pr.	2	64	232
Bagley	Bath	1900	157 0	17 0	4 7	2	167	3,920	28	3 3-pr.	3	29	..
Bailey	Morris Heights	1899	205 0	19 0	6 0	2	235	5,000	30	4 6-pr.	2	..	20
Barney	Bath	1900	157 0	17 0	4 7	2	167	3,920	28	3 3-pr.	3	29	..
Biddle	Bath	1900	157 0	17 0	4 7	2	167	3,910	28	3 3-pr.	3	29	..
Blakely	Boston ..	1902	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
De Long	Boston ..	1901	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Du Pont	Bristol, R.I.	1897	175 0	17 8	4 8	2	165	3,400	28·58	4 1-pr.	3	32	76
Farragut	San Francisco	1898	213 6	20 8	6 0	2	273	5,600	30	4 6-pr.	2	..	76
Foote..	Baltimore ..	1896	160 0	16 1	5 0	2	142	2,000	24·5	3 1-pr.	3	24	44
Goldsborough ..	Portland, Ore.	1902	194 8	20 5	5 0	2	247·5	5,880	30	4 6-pr.	2	..	131
Nicholson ..	Elizabethport	1902	174 6	17 0	4 6	2	174	3,500	26	3 3-pr.	3	29	..
O'Brien	Elizabethport	1902	174 6	17 0	4 6	2	174	3,500	26	3 3-pr.	3	29	..
Porter	Bristol, R.I.	1896	175 0	17 8	4 8	2	165	3,800	28·63	4 1-pr.	3	32	76
Rodgers	Baltimore ..	1896	160 0	16 1	5 0	2	142	2,000	24·5	3 1-pr.	3	24	44
Rowan	Seattle, Wash.	1898	170 0	17 0	5 11	2	182	3,200	26	4 1-pr.	3	32	60
Shubrick	Richmond ..	1899	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Stockton	Richmond ..	1899	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Stringham ..	Wilmington	1899	225 0	22 0	6 6	2	340	7,200	30	7 6-pr.	2	..	120
Thornton.. ..	Richmond	1900	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Tingey	Baltimore ..	1902	175 0	17 6	4 8	2	165	3,000	26	3 3-pr.	3	29	70
Wilkes	Morris Heights	1901	175 0	17 6	4 8	2	165	3,000	26·25	3 3-pr.	3	29	70
Winslow	Baltimore ..	1897	160 0	16 1	5 0	2	142	2,000	24·5	3 1-pr.	3	24	44
SEA-GOING—													
Cushing	Bristol, R.I.	1890	138 9	14 3	4 11	2	105	1,720	22·5	3 1-pr.	3	23	36
Davis	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	22·5	3 1-pr.	3	..	..
Dahlgren	Bath	1899	147 0	16 4	4 7	2	146	4,200	30·5	4 1-pr.	2	..	32
Ericsson	Dubuque, Iowa	1894	149 7	15 6	4 9	2	120	1,800	24	4 1-pr.	3	23	35
Fox	Portland, Ore.	1898	146 0	15 4	5 4	2	132	1,750	22·5	3 1-pr.	3	..	..
Manly	Yarrow ..	..	..	..	..	..	..	..	..	..	..	..	..
Morris	Bristol, R.I.	1898	138 3	15 6	4 1	2	105	1,750	24	3 1-pr.	3	..	28
Somers	Schichau, Elbing ..	..	149 3¾	17 5	..	2	145	..	..	..	..	..	..
T. A. M. Craven	Bath	1899	147 0	16 4	4 7	2	146	4,200	30·5	4 1-pr.	2	..	32
THIRD CLASS—													
Gwin..	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	20·88	1 1-pr.	2	..	8
Mackenzie ..	Philadelphia	1898	99 3	12 9	4 3	1	65	850	20	1 1-pr.	2	..	15·3
McKee	Philadelphia	1898	99 3	12 9	4 3	1	65	850	19·82	2 1-pr.	2	..	..
Talbot	Bristol, R.I.	1897	99 6	12 6	3 3	1	46	850	21·15	1 1-pr.	2	..	8·8
Stiletto (wood)	Bristol, R.I.	..	88 6	11 0	3 0	1	31	359	18·22	..	2	..	4
SUBMARINE—													
Adder	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Grampus ..	S. Francisco	Bldg.	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Holland	Elizabethport	1896	54 0	10 3	..	1	74	45	8	1 dynamite	1	5	..
Moccassin ..	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Pike	S. Francisco	Bldg.	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Plunger	Elizabethport	1902	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Porpoise	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..
Protector	Bridgeport, Conn. ..	1892	65 0	11 0	..	2	170	250	7—11	..	3	6	..
Shark	Elizabethport	1901	63 4	11 9	..	1	120	160	7—8	..	1	..	..

* Guns of destroyers of this class are Driggs Semi-Automatic Quick-Firers.

With the exception of the Lawrence, Macdonough, and Stewart, all the destroyers in the first alphabetical list have Thornycroft water-tube boilers. The Farragut, Goldsborough and Stringham have also boilers of this type.

The submarine Fulton, of the Holland type, built experimentally by the Holland Company, was launched June, 1901.

PLANS

OF

BRITISH AND FOREIGN SHIPS

SCALE FOR FULL-PAGE PLATES
50 FEET TO THE INCH.

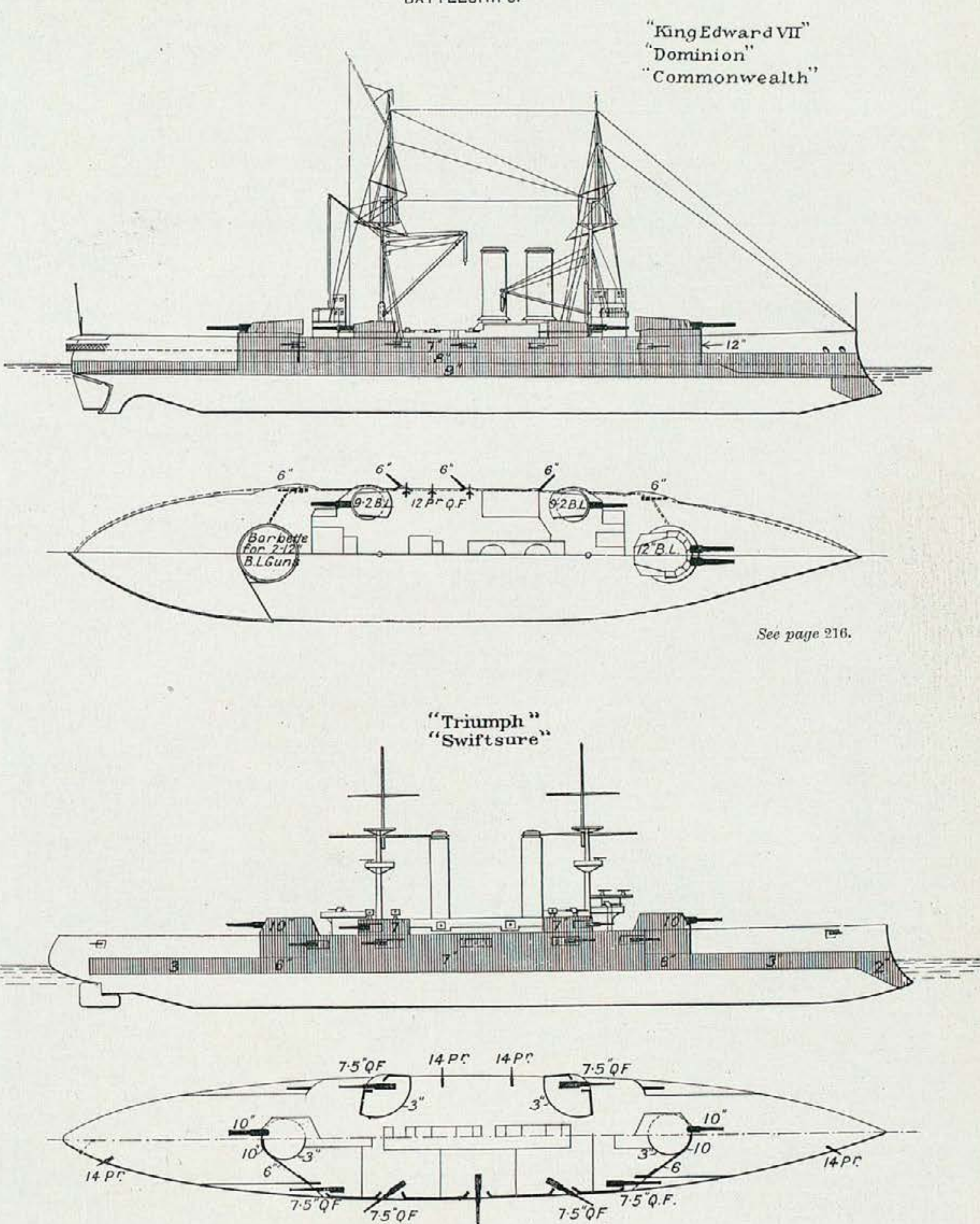
0 10 20 30 40 50 100 150

SCALE FOR HALF-PAGE PLATES.
100 FEET TO THE INCH.

0 10 20 30 40 50 60 70 80 90 100 200 300

GREAT BRITAIN.

BATTLESHIPS.



See page 216.

See page 219.

PLATE 1.

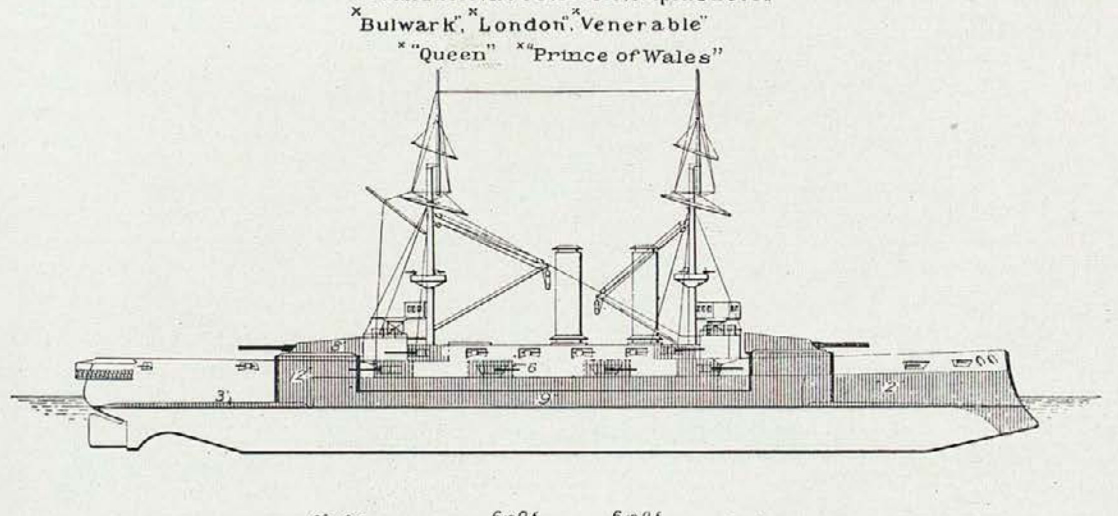
GREAT BRITAIN.

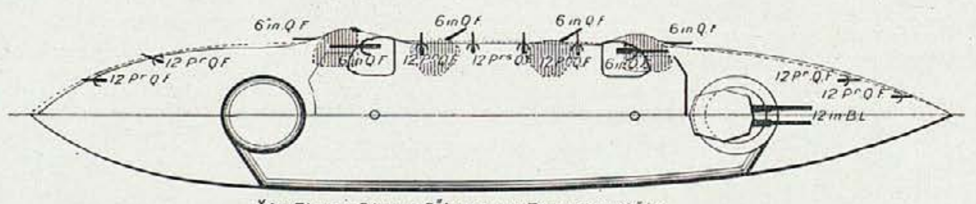
BATTLESHIPS.

Duncan.
Cornwallis.
Russell.
Exmouth.
Montagu.
Albemarle.

See page 214.

"Formidable", "Irresistible", "Implacable",
ˣ"Bulwark", ˣ"London", ˣ"Venerable"
ˣ"Queen" ˣ"Prince of Wales"



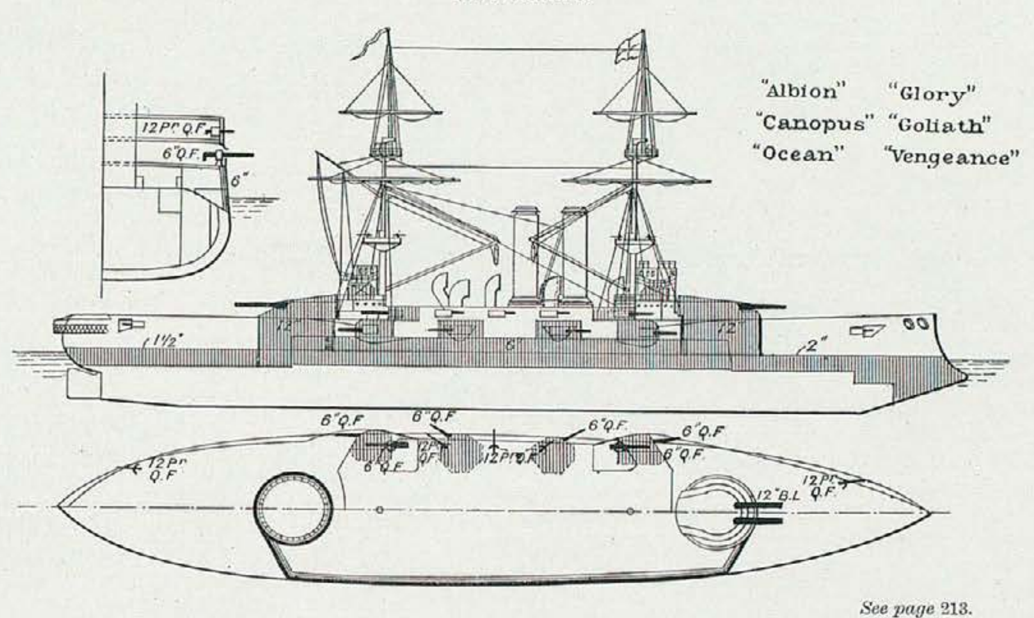


ˣIn These Ships 9" Armour Tapers to 2" at 30 ft From Bow, & They Have no Forward Bulkhead

See page 214.

GREAT BRITAIN.

BATTLESHIPS.



"Albion" "Glory"
"Canopus" "Goliath"
"Ocean" "Vengeance"

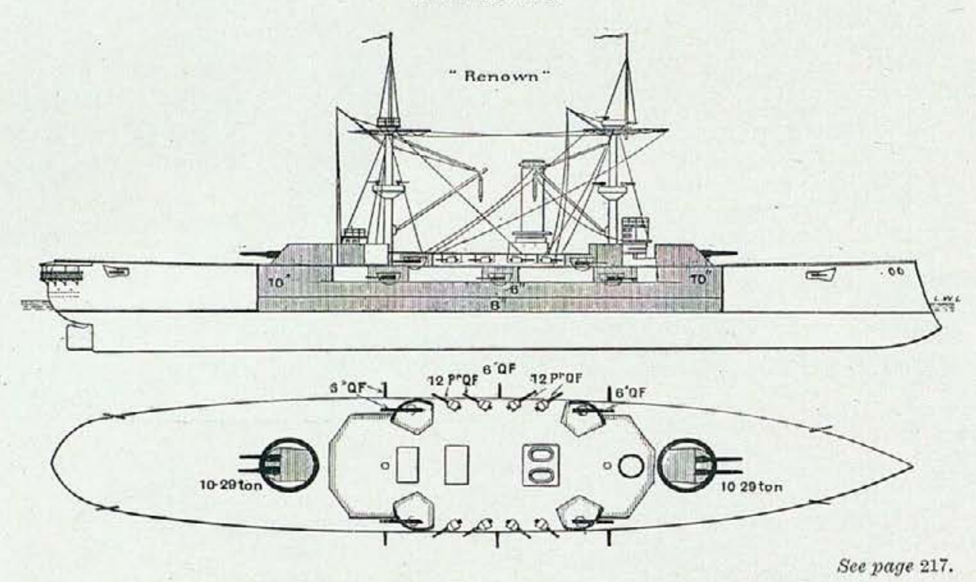
See page 213.

Majestic. Magnificent. Hannibal
Prince George. Victorious. Mars.
Illustrious. Cæsar. Jupiter

See page 216.

GREAT BRITAIN.

BATTLESHIPS.



See page 217.

"Centurion" & "Barfleur"

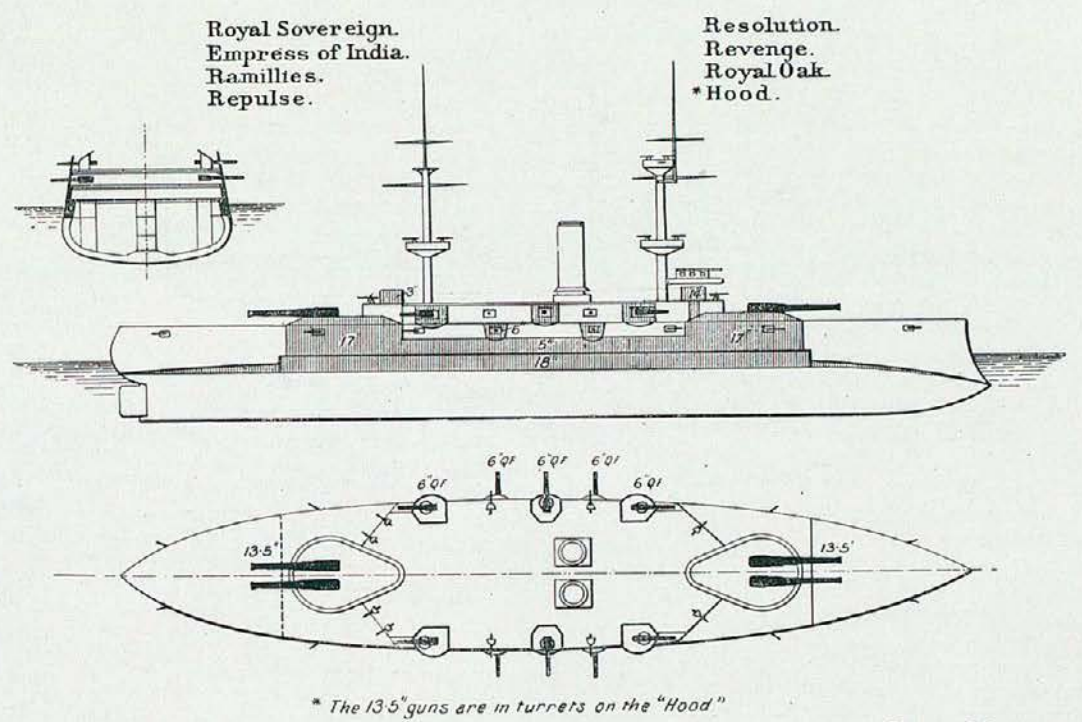
9"
4"
12"
9"
L.W.L.
4·7" QF
4·7" QF
4·7" QF
6 Pr
6 Pr
6 PR
6 PR
29 ton BL
29 ton BL

N.B. All the 4·7 inch Guns will be replaced with 6 inch Guns in Casemates

See page 213

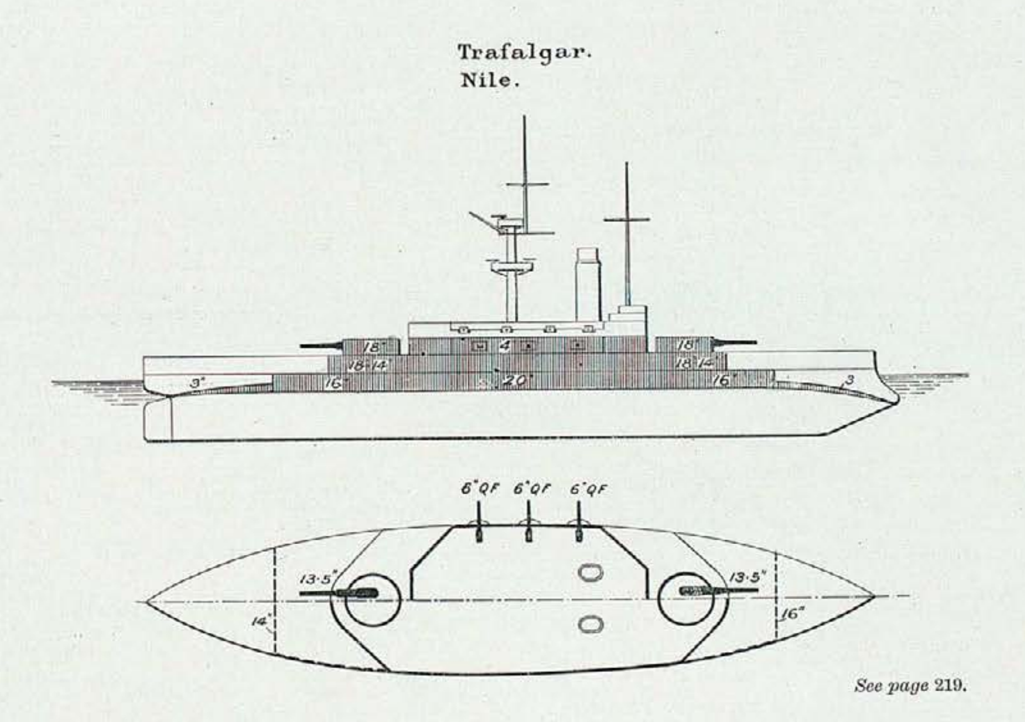
GREAT BRITAIN.

BATTLESHIPS.



* The 13·5" guns are in turrets on the "Hood."

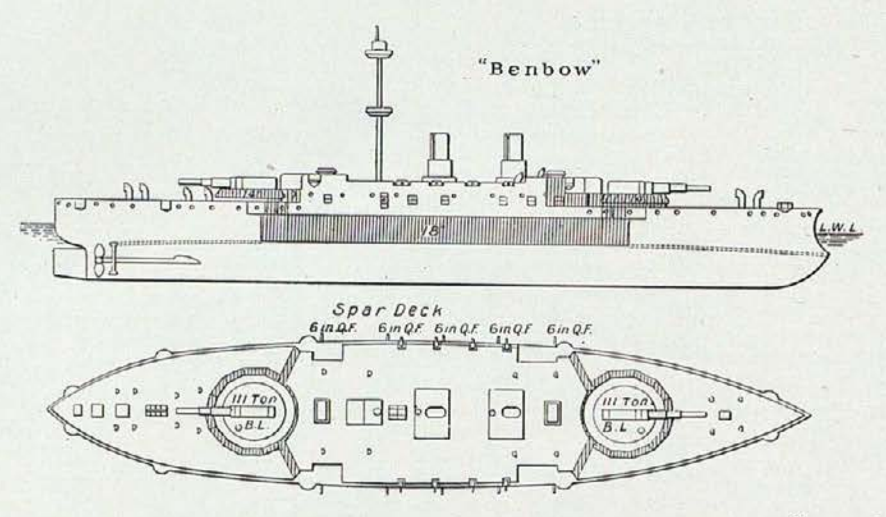
See page 218.



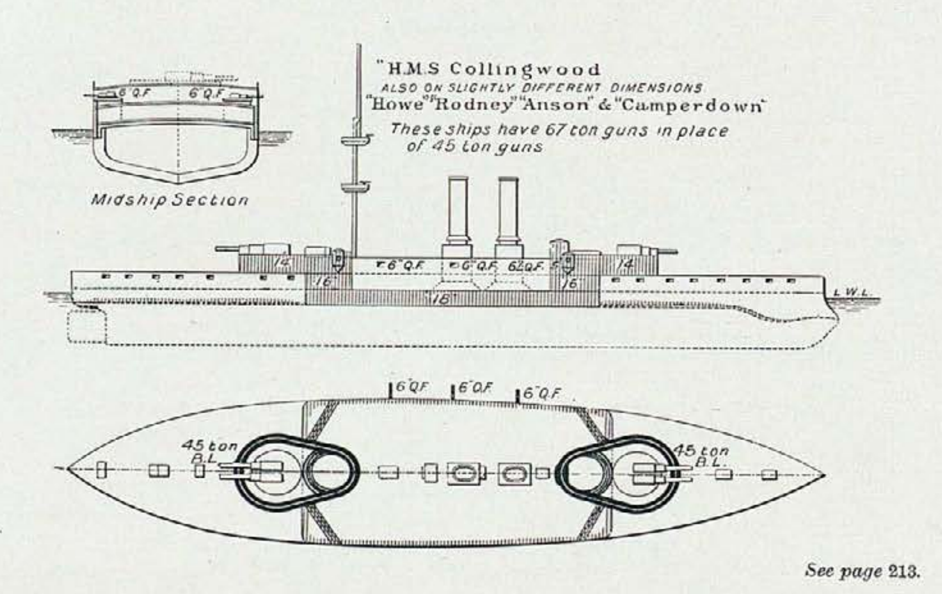
See page 219.

GREAT BRITAIN.

BATTLESHIPS.



See page 212.

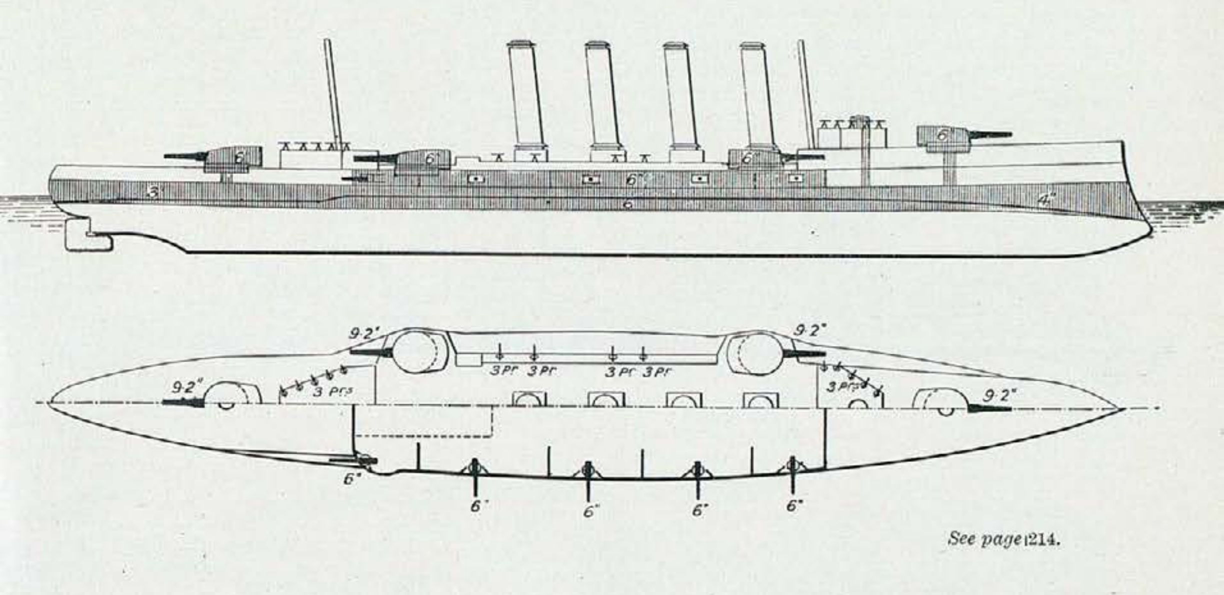


See page 213.

GREAT BRITAIN.

ARMOURED CRUISERS.

Duke of Edinburgh.
Black Prince.



See page 214.

Devonshire. Roxburgh.
Hampshire. Antrim.
Argyle. Carnarvon.

See page 214.

GREAT BRITAIN.

ARMOURED CRUISERS.

Monmouth.	Suffolk.
Kent.	Berwick.
Essex	Cumberland.
Bedford.	Donegal.
Cornwall.	Lancaster.

See page 216.

"Drake"
"King Alfred"
"Good Hope"
"Leviathan"

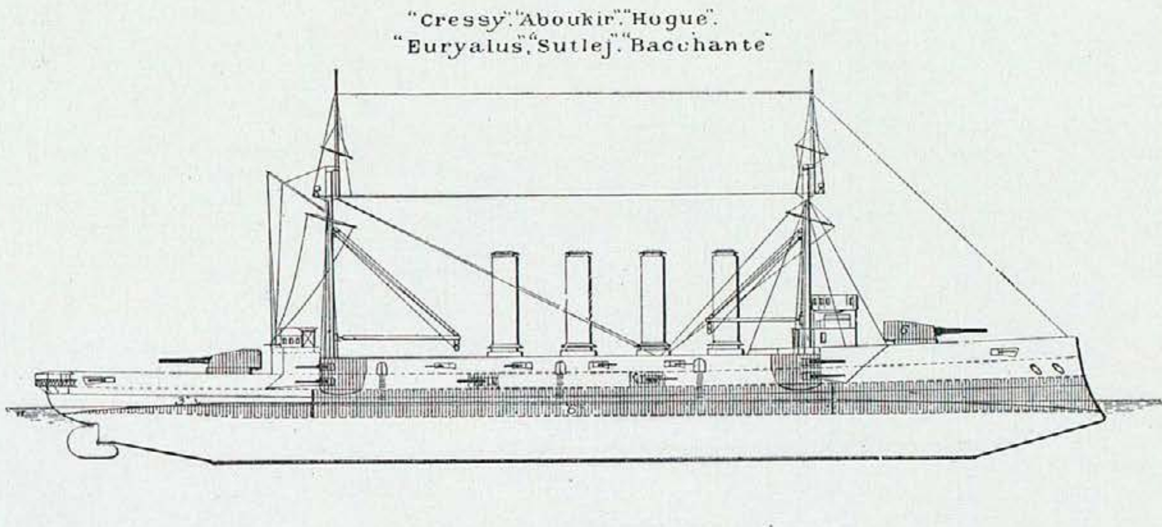
See page 214.

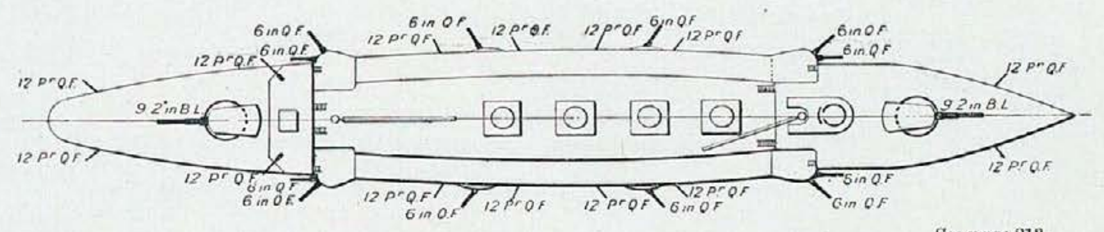
PLATE 8.

GREAT BRITAIN.

ARMOURED CRUISER.

"Cressy", "Aboukir", "Hogue".
"Euryalus", "Sutlej", "Bacchante"

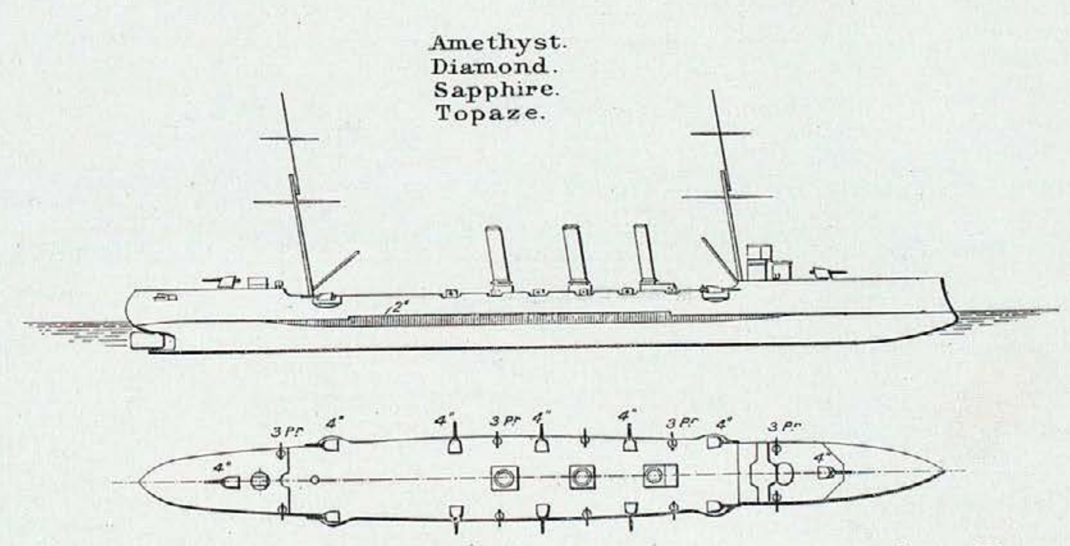




See page 213.

CRUISER.

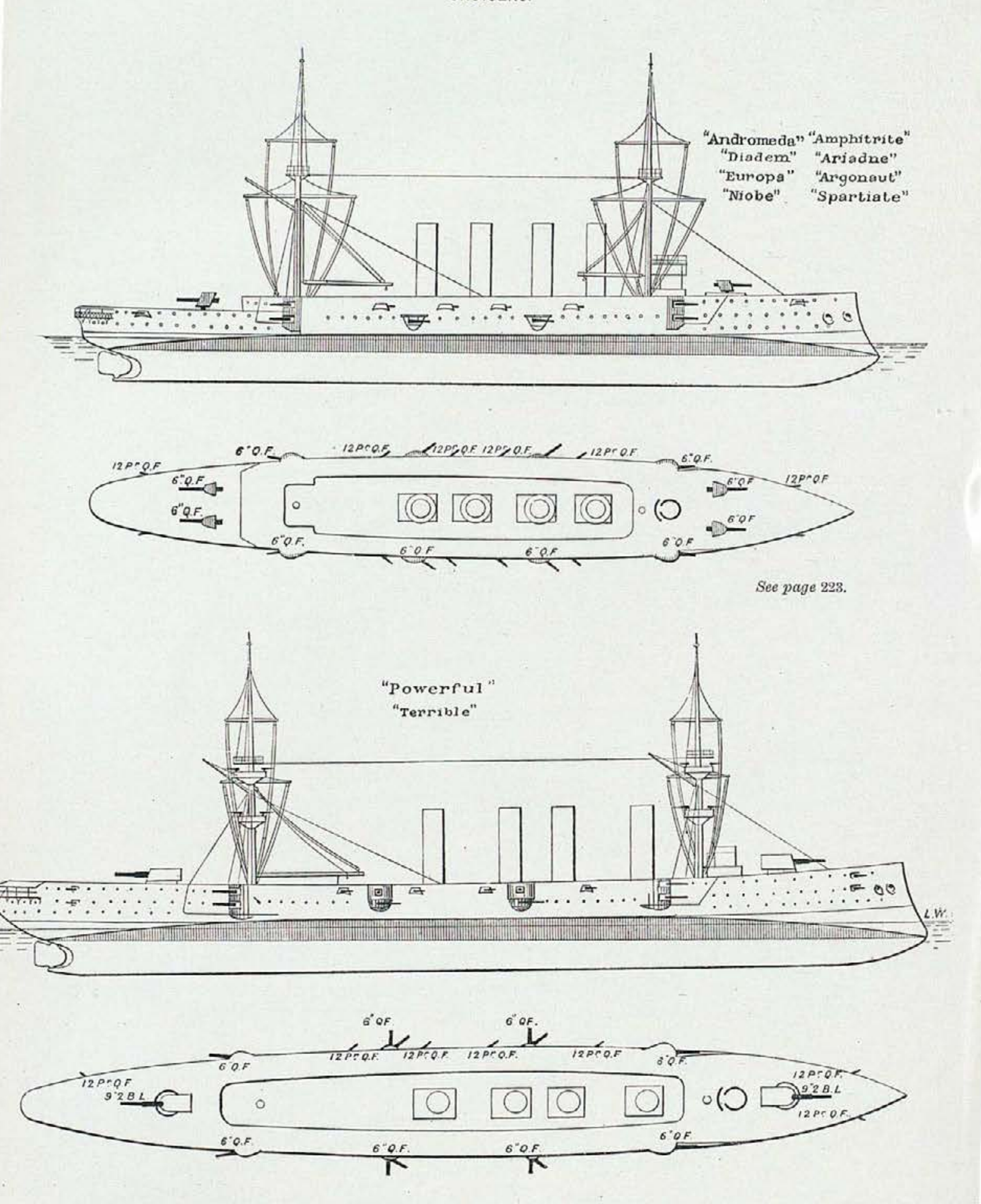
Amethyst.
Diamond.
Sapphire.
Topaze.



See page 220.

GREAT BRITAIN.

CRUISERS.



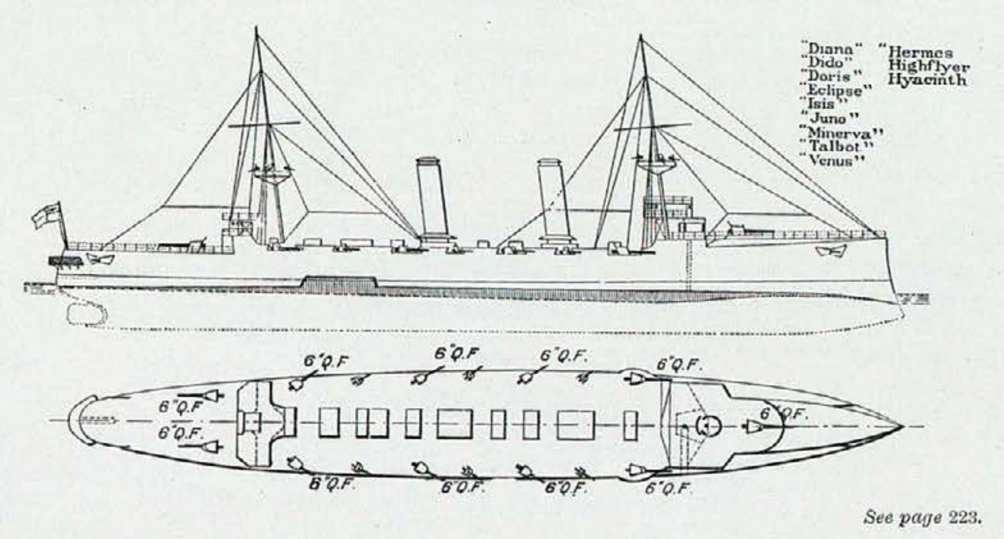
See page 223.

See page 229.

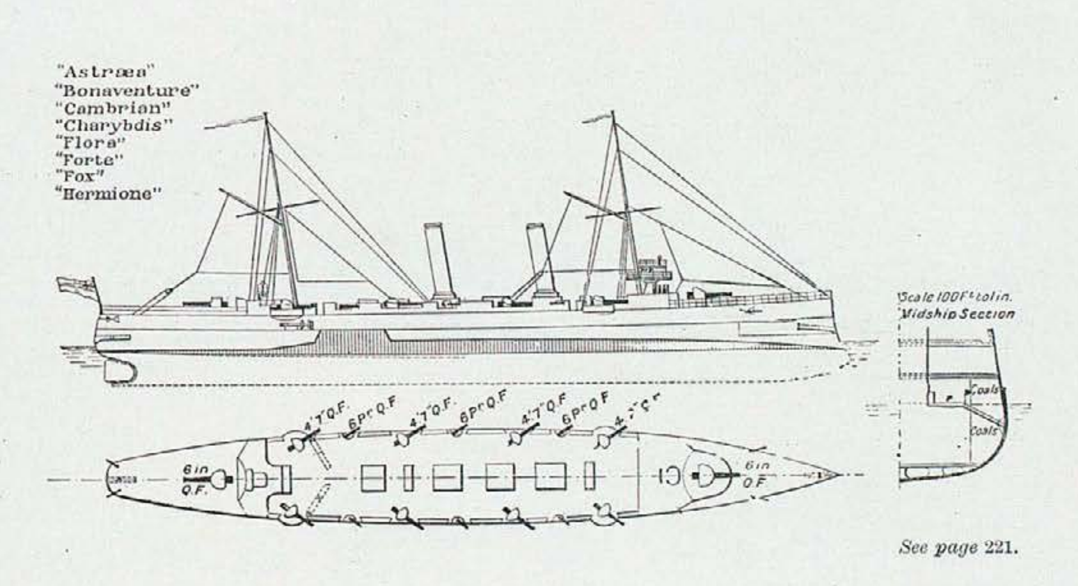
PLATE 10.

GREAT BRITAIN.

CRUISERS.



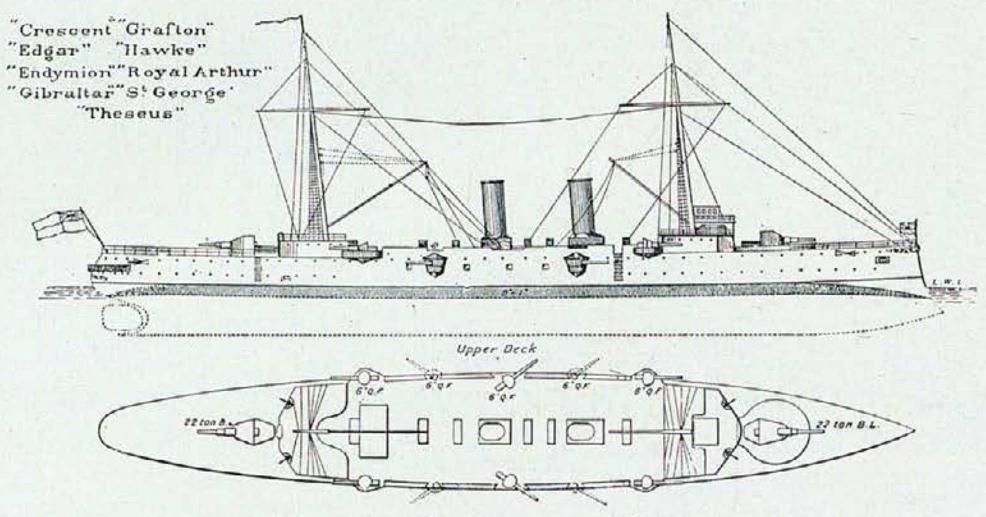
See page 223.



See page 221.

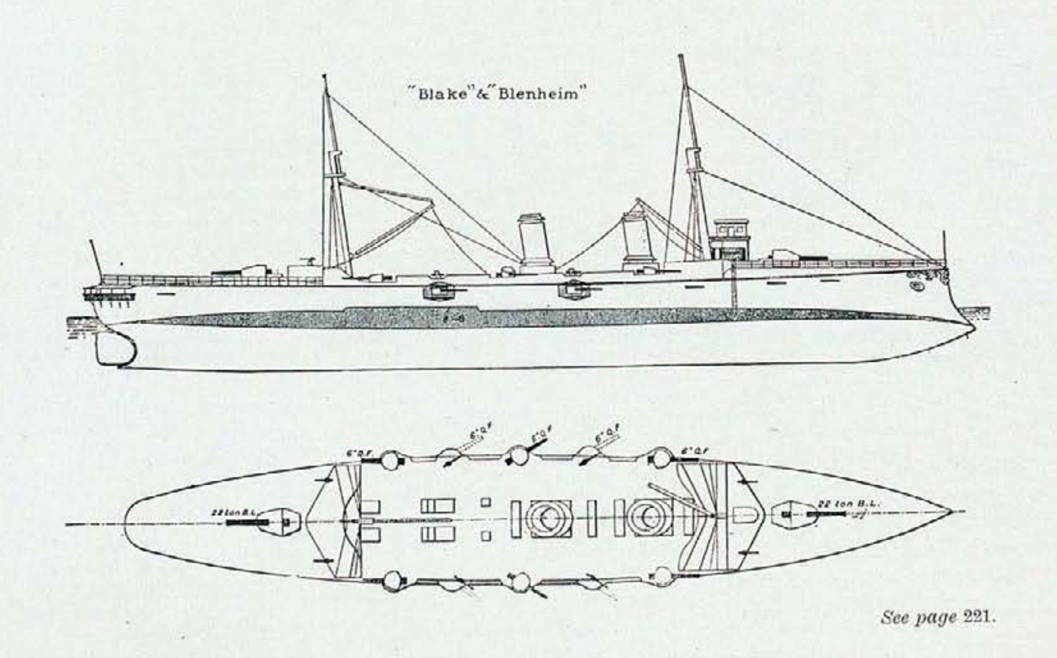
GREAT BRITAIN.

CRUISERS.



Note. *The Crescent and Royal Arthur have two 6 in guns forward in place of the 22 ton gun, and have a forecastle.*

See page 223.

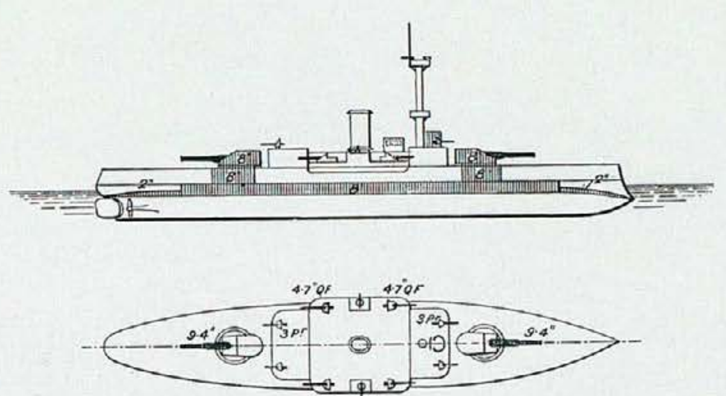


See page 221.

ARGENTINA.

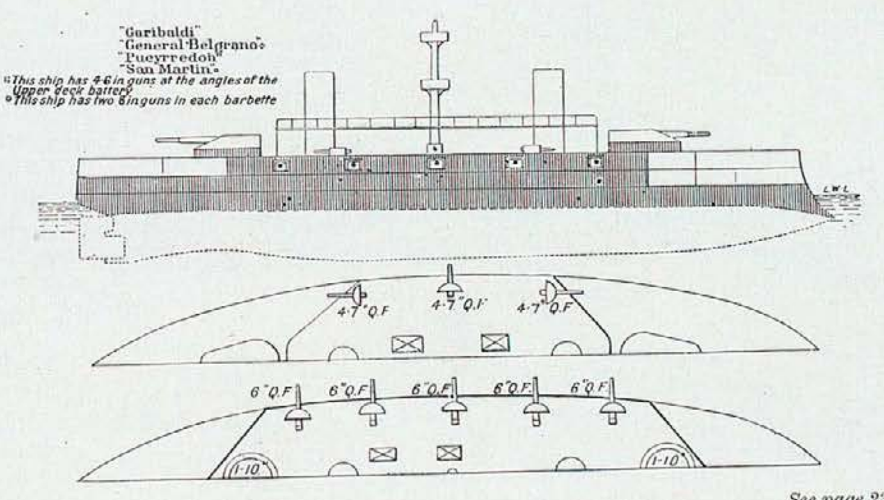
COAST DEFENCE SHIP.

Libertad.
Independencia.



See page 237.

ARMOURED CRUISER.

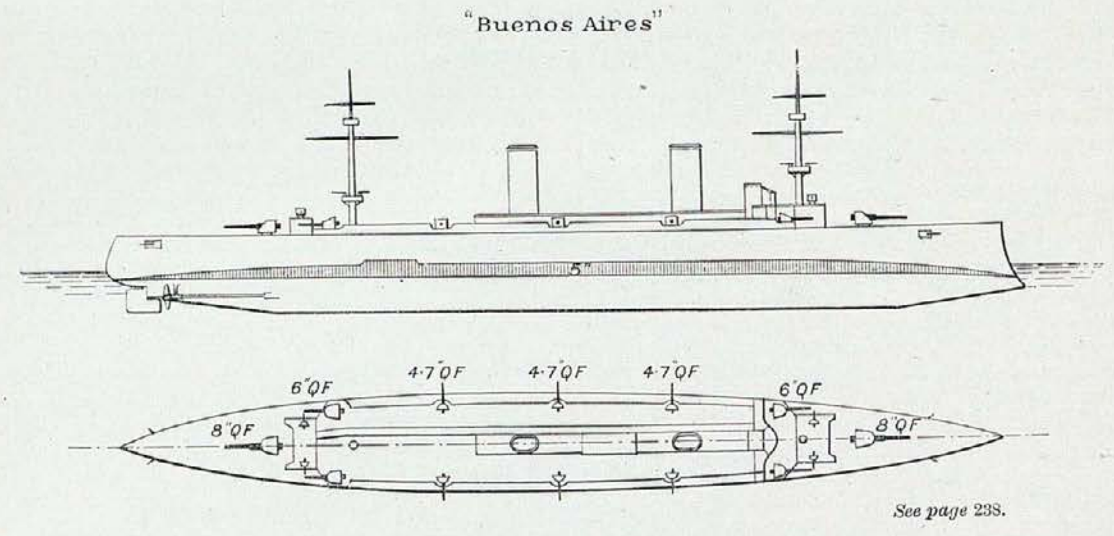


See page 237.

ARGENTINA.

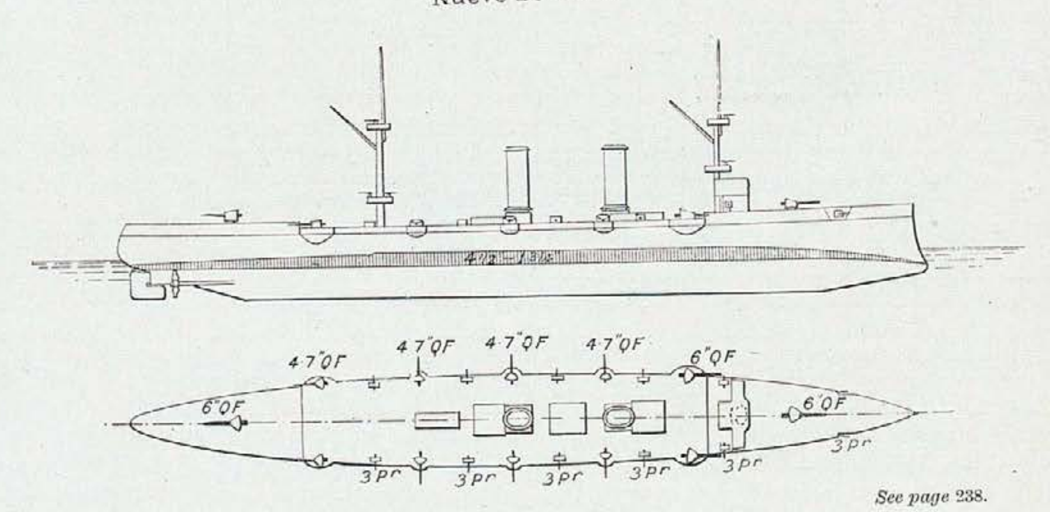
CRUISERS.

"Buenos Aires"



See page 238.

"Nueve de Julio"

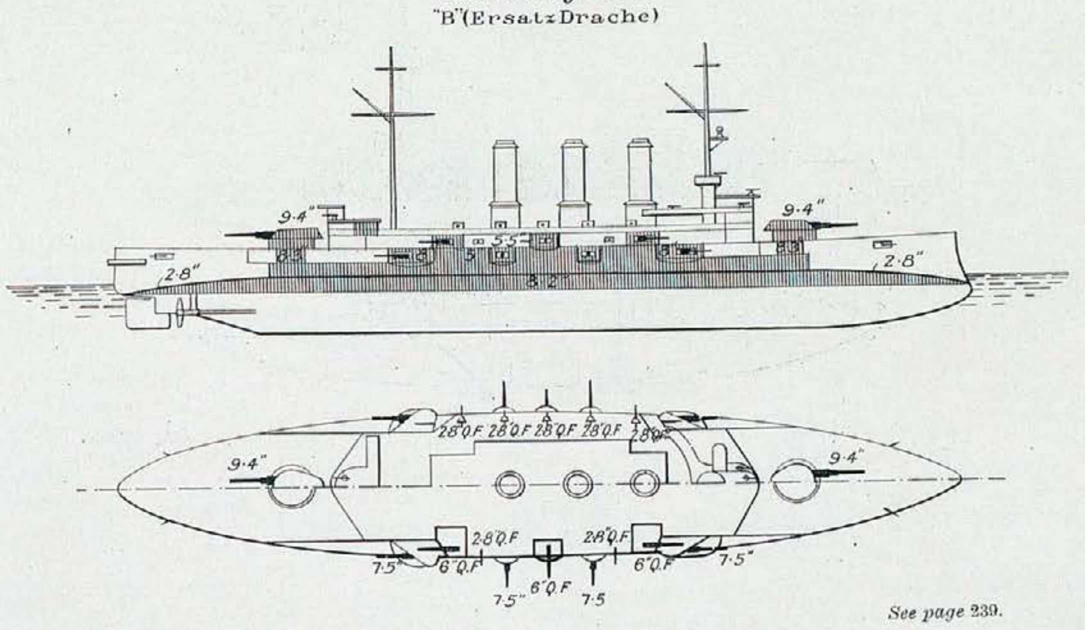


See page 238.

AUSTRIA.

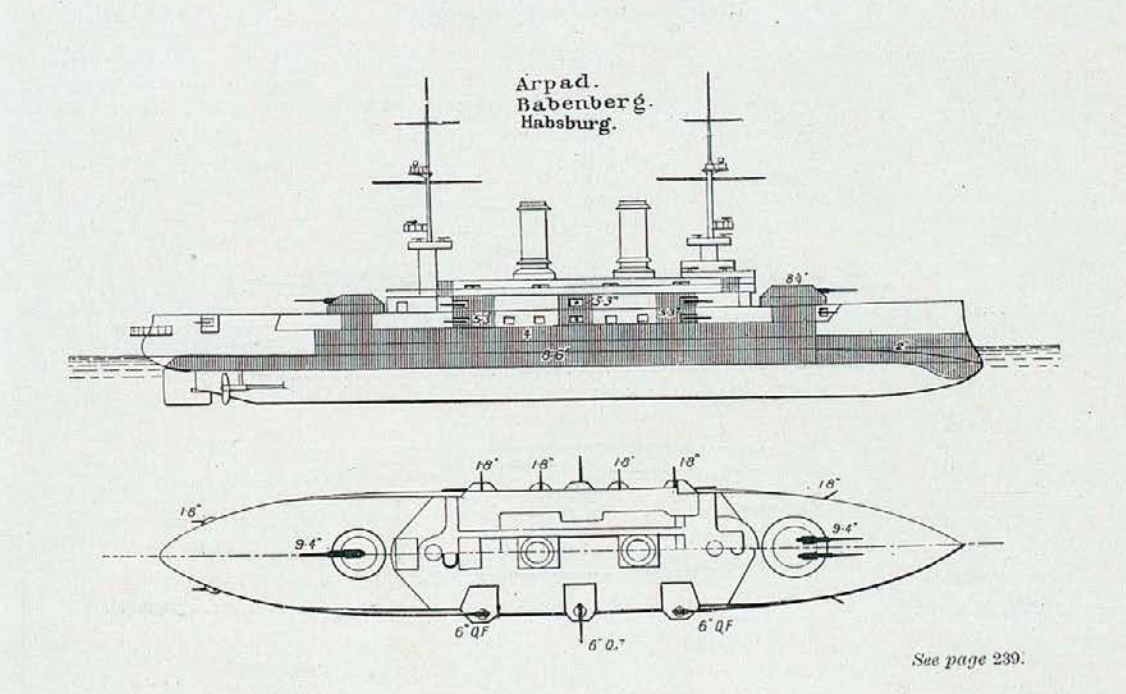
BATTLESHIPS.

Erzherzog Karl
"B" (Ersatz Drache)



See page 239.

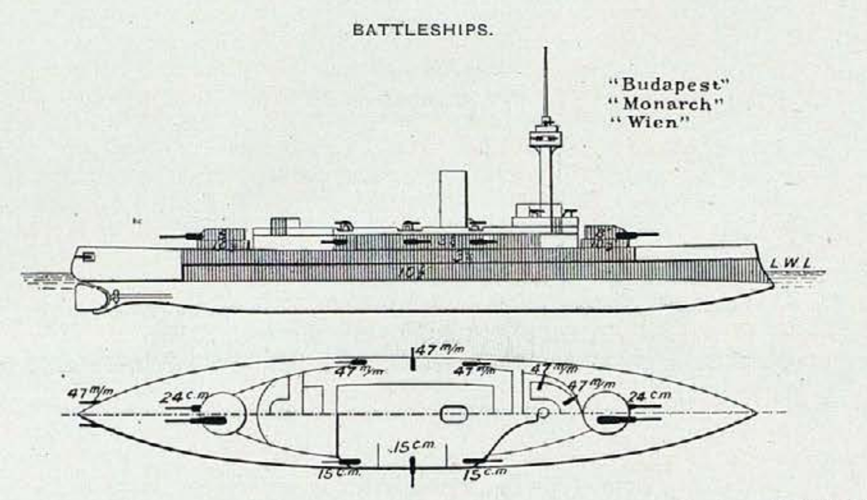
Arpad.
Babenberg.
Habsburg.



See page 239.

AUSTRIA.

BATTLESHIPS.



See page 239.

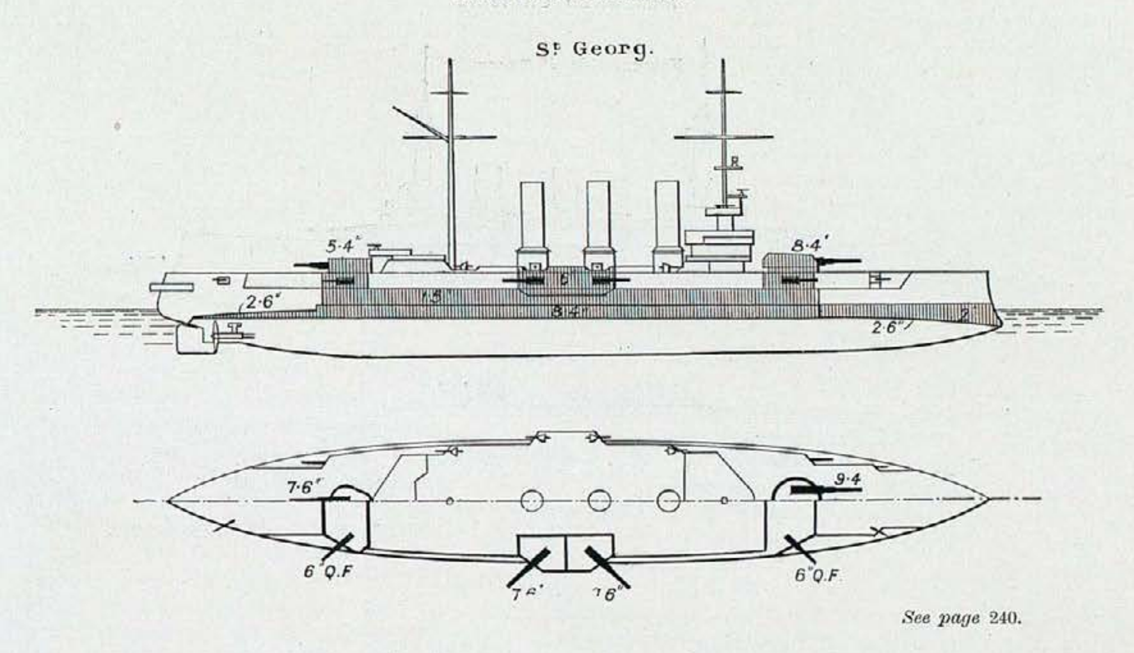
Kronprinz Erzherzog Rudolph

10"
12"
2"
47 QF
See page 240.

AUSTRIA.

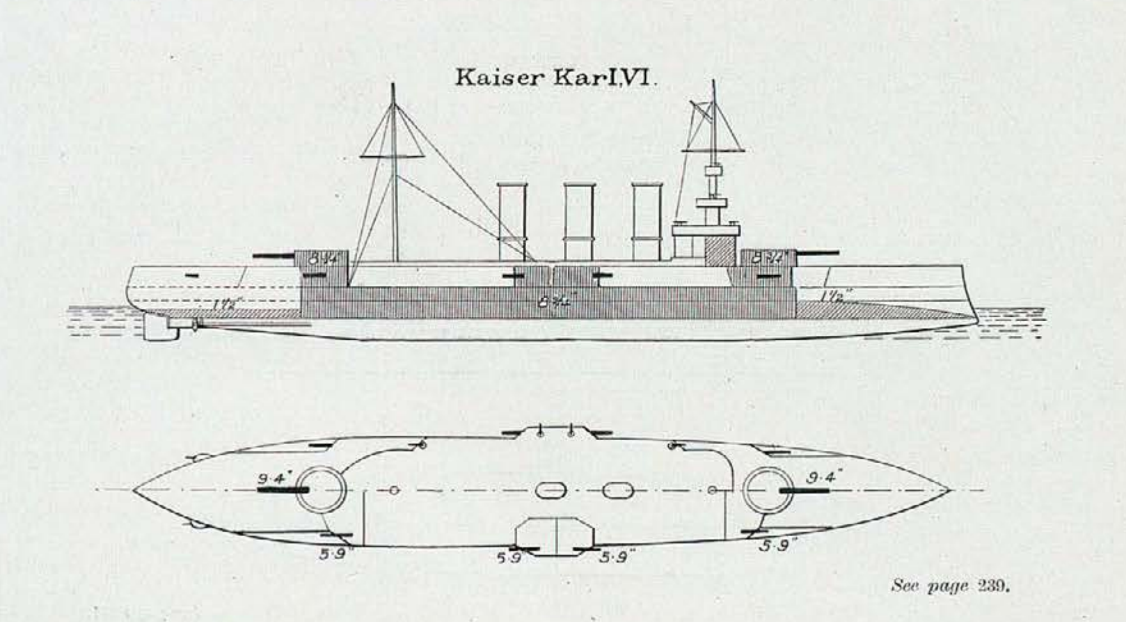
ARMOURED CRUISERS.

St. Georg.



See page 240.

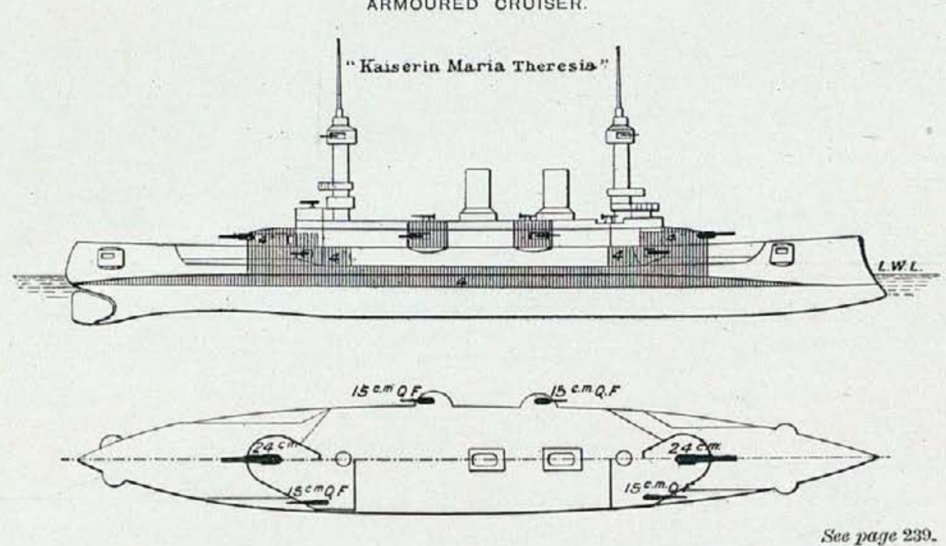
Kaiser Karl VI.



See page 239.

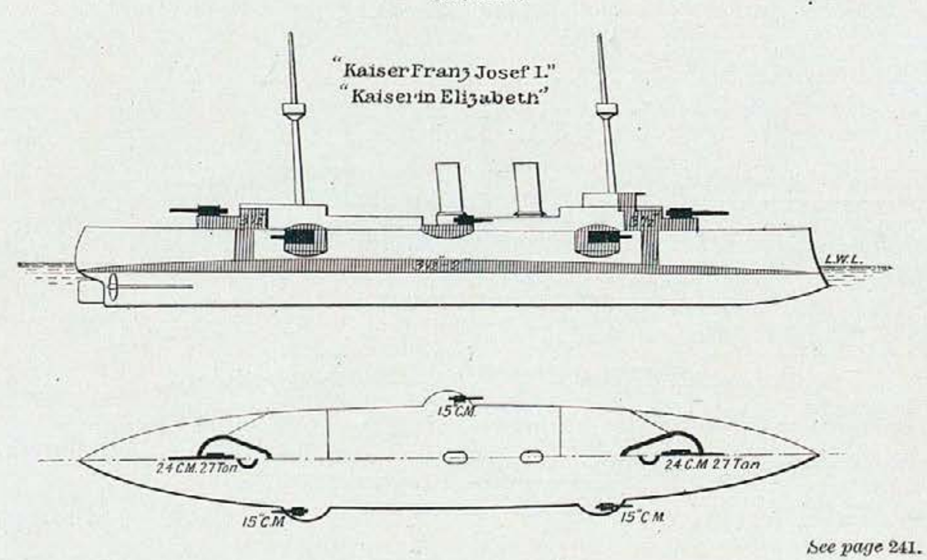
AUSTRIA.

ARMOURED CRUISER.



See page 239.

CRUISER.

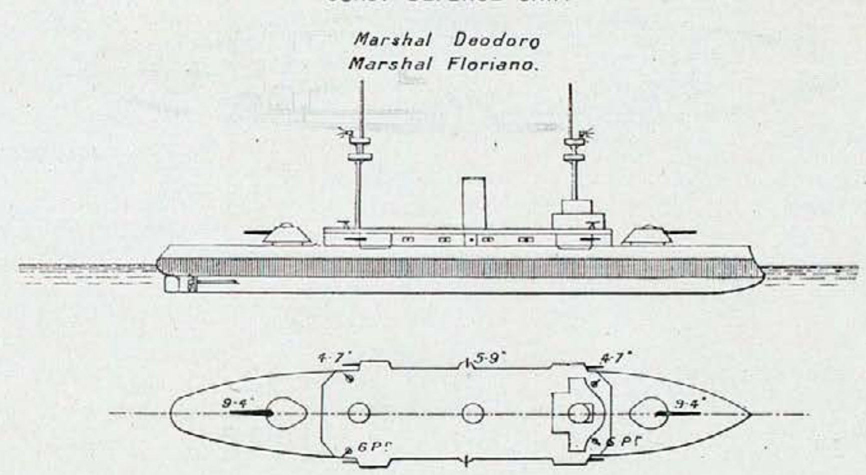


See page 241.

BRAZIL.

COAST DEFENCE SHIP.

Marshal Deodoro
Marshal Floriano.

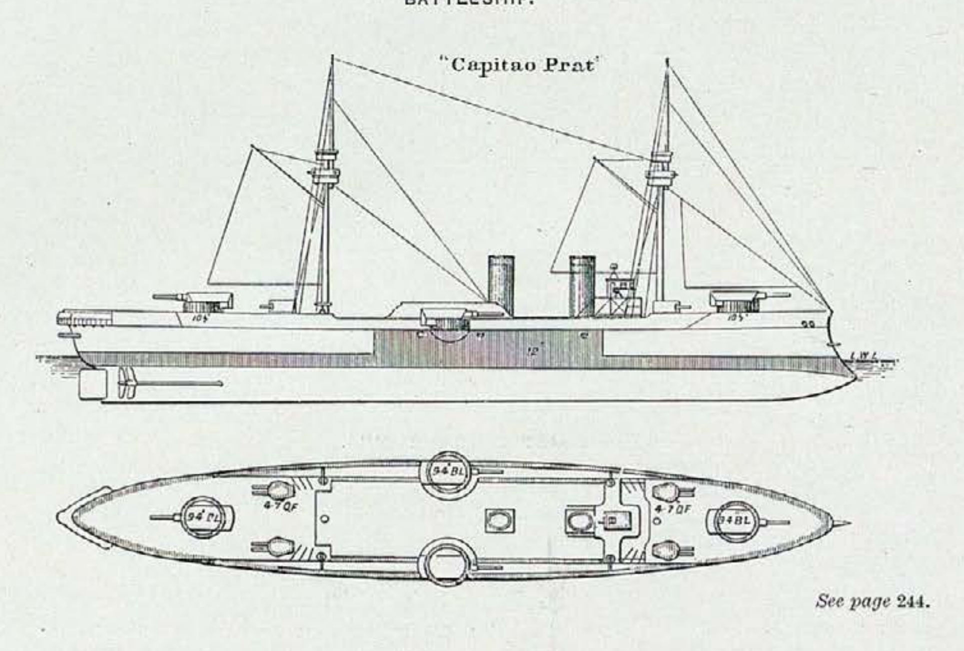


See page 242.

CHILI.

BATTLESHIP.

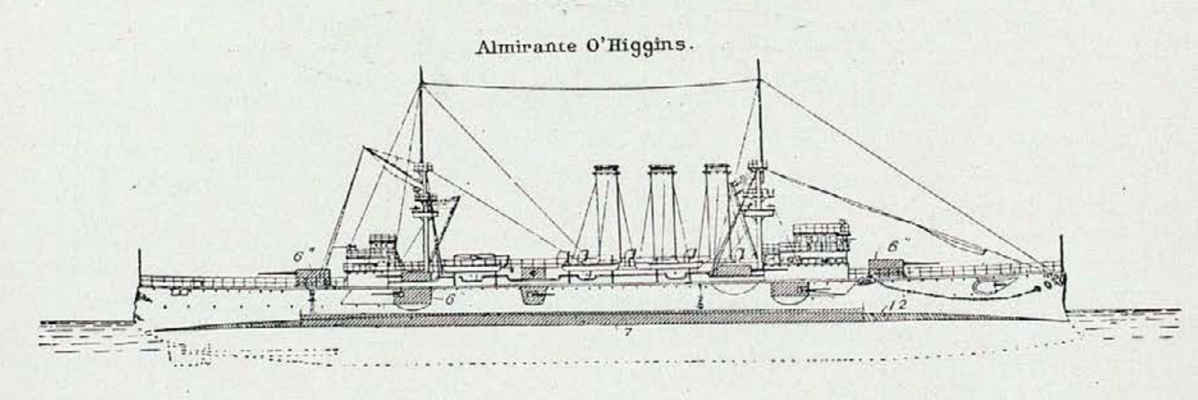
"Capitao Prat"

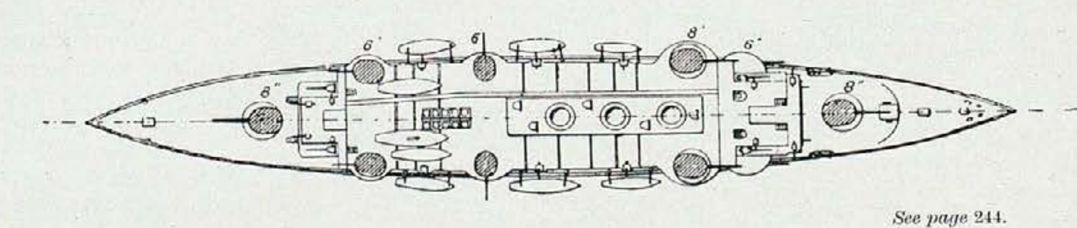


See page 244.

ARMOURED CRUISER.

Almirante O'Higgins.



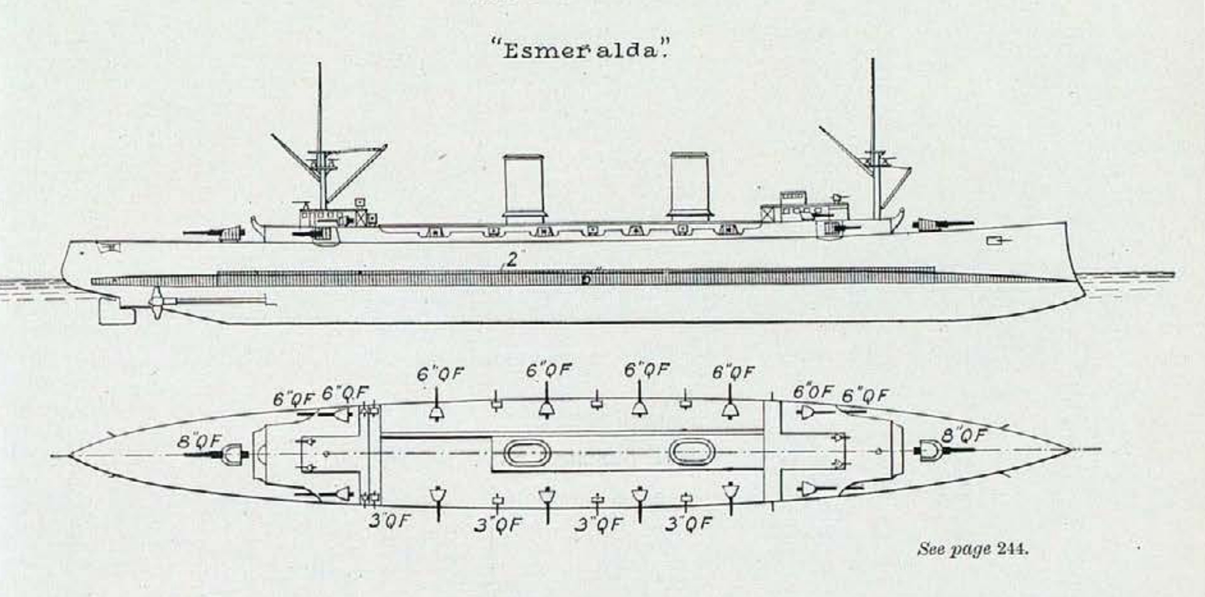


See page 244.

CHILI.

ARMOURED CRUISER.

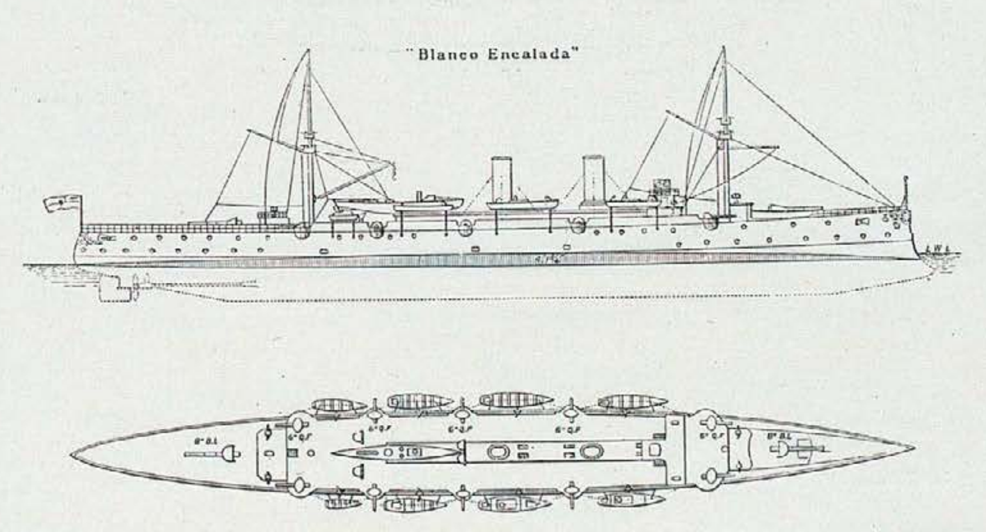
"Esmeralda".



See page 244.

CRUISER.

"Blanco Encalada"



See page 244.

DENMARK.

COAST DEFENCE SHIP.

Herluf Trolle.

2·2"

7·5"

7·5"

9·4"

2·2"

2·2"

2·2"

9·4"

5·9" Q.F.

5·9" Q.F.

2·2"

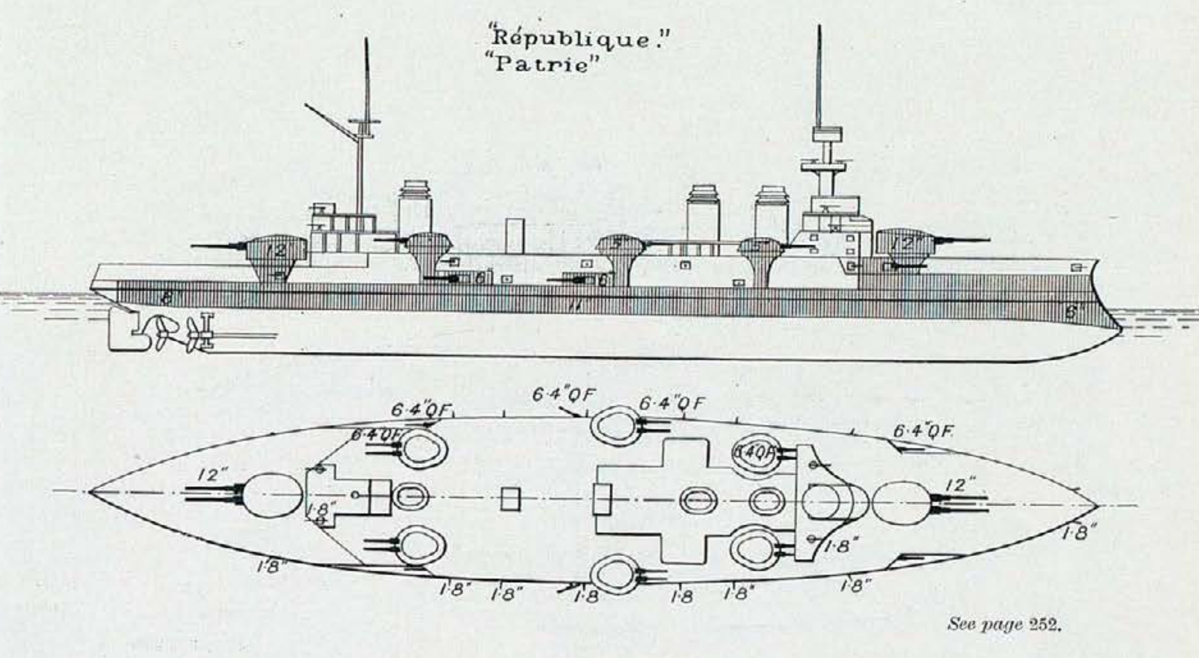
2·2"

See page 246.

FRANCE.

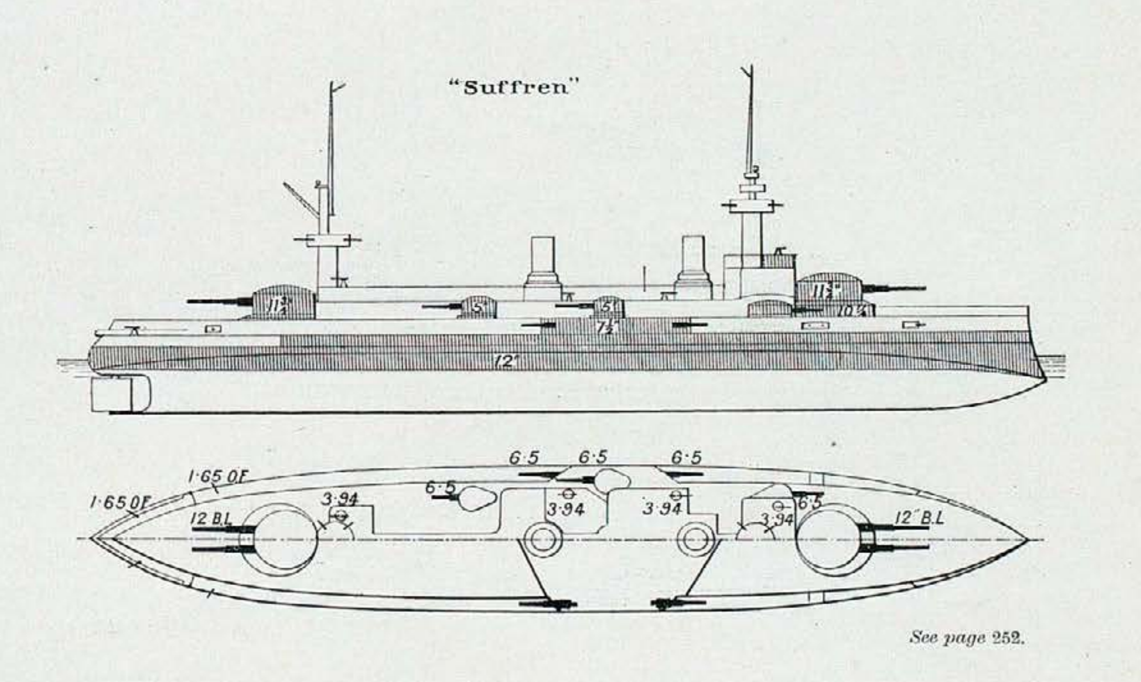
BATTLESHIPS.

"République."
"Patrie"



See page 252.

"Suffren"

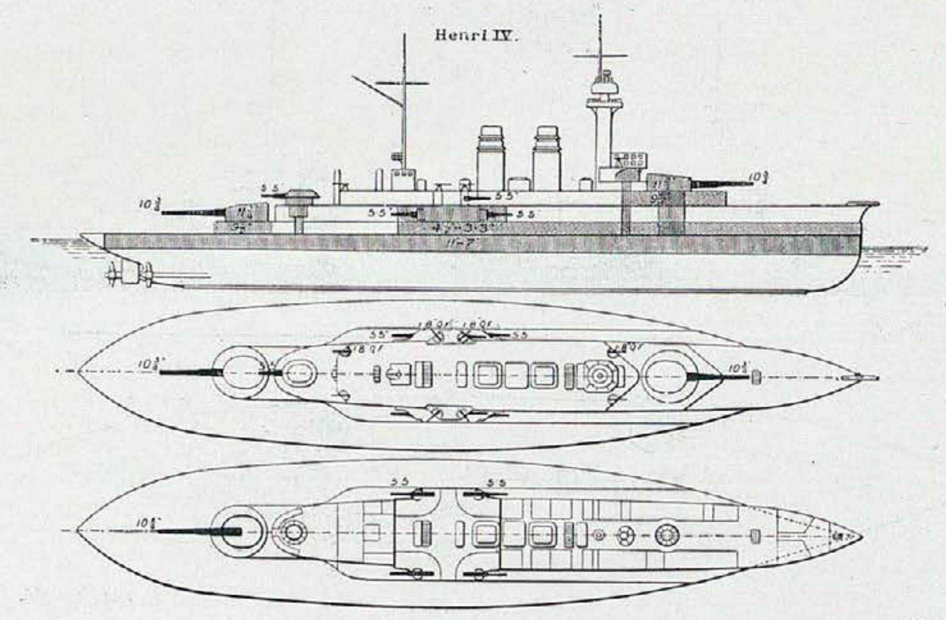


See page 252.

FRANCE.

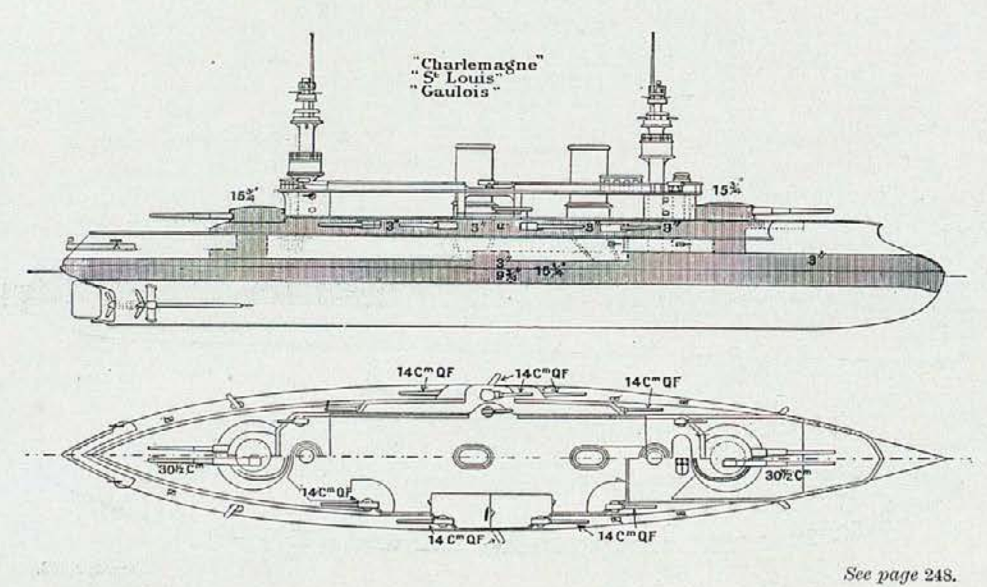
BATTLESHIPS.

Henri IV.



See page 250.

"Charlemagne"
"St Louis"
"Gaulois"

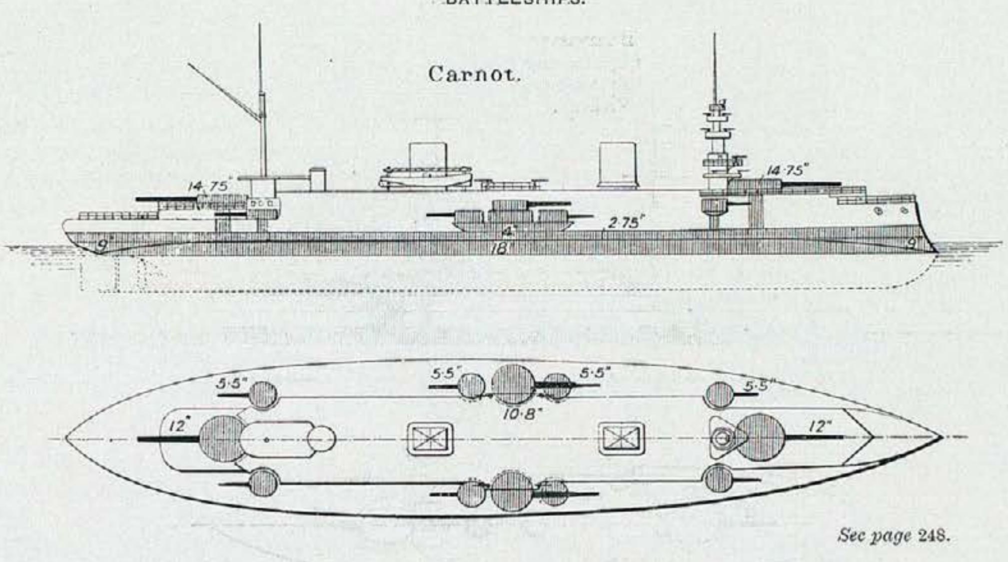


See page 248.

FRANCE.

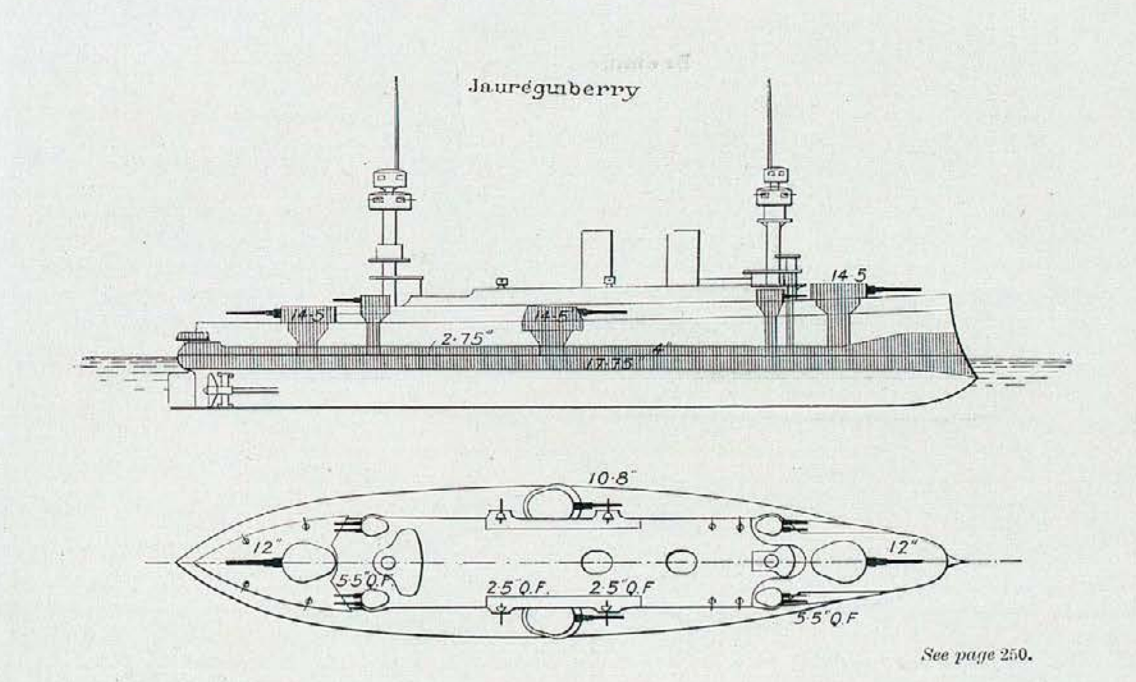
BATTLESHIPS.

Carnot.



See page 248.

Jauréguiberry

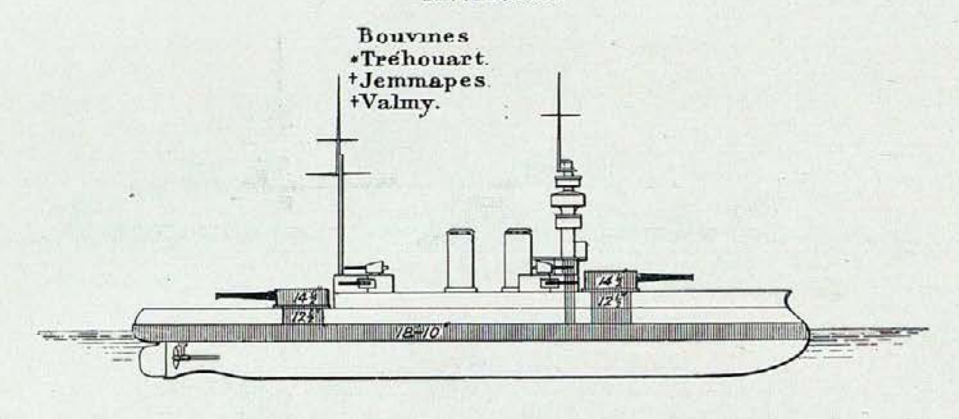


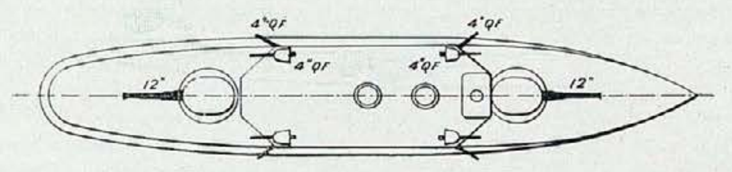
See page 250.

FRANCE.

BATTLESHIPS.

Bouvines
***Tréhouart.**
†Jemmapes.
†Valmy.





** The "Tréhouart" has but one funnel.*

† These ships have 13·4" guns in the turret and only 4·4" guns. The forward 13·4" gun is mounted on the same deck as the after one.

See page 248.

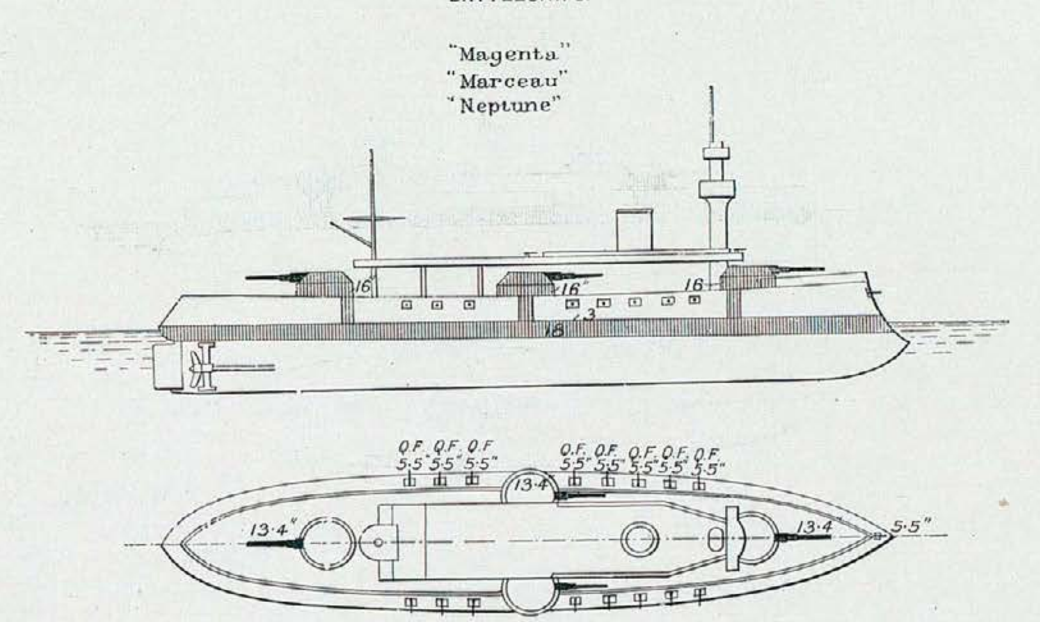
Brennus

See page 248.

FRANCE.

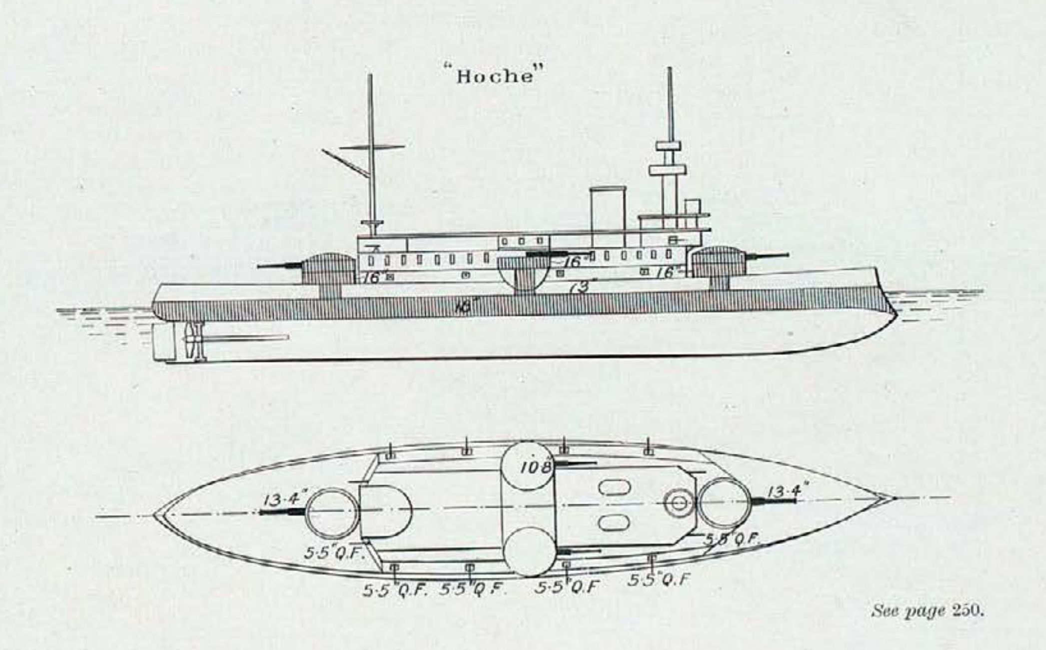
BATTLESHIPS.

"Magenta"
"Marceau"
"Neptune"



See page 251.

"Hoche"

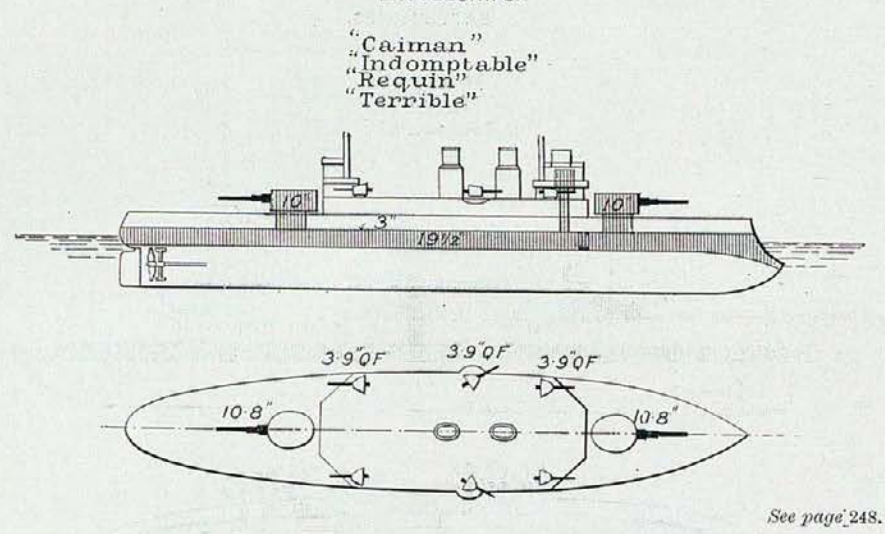


See page 250.

FRANCE.

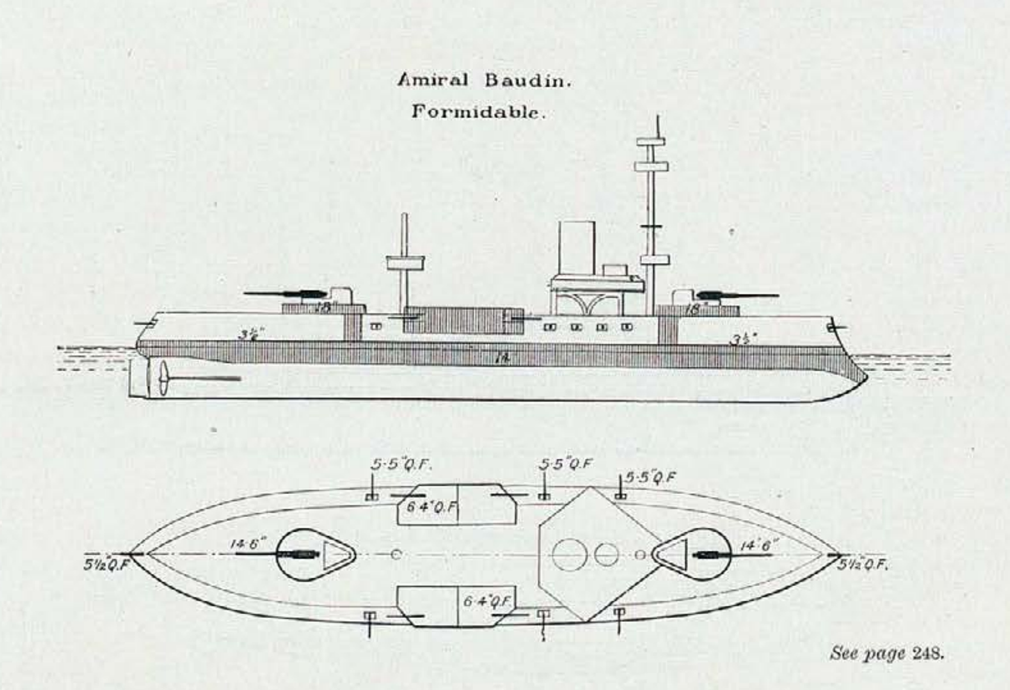
BATTLESHIPS.

"Caiman"
"Indomptable"
"Requin"
"Terrible"



See page 248.

Amiral Baudin.
Formidable.

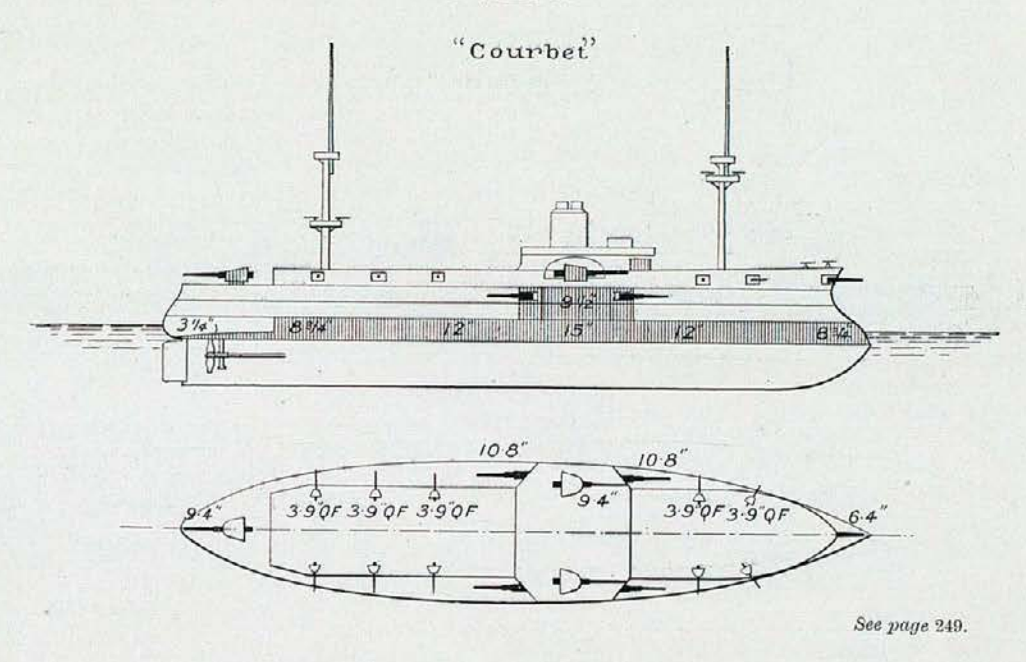


See page 248.

FRANCE.

BATTLESHIP

"Courbet"



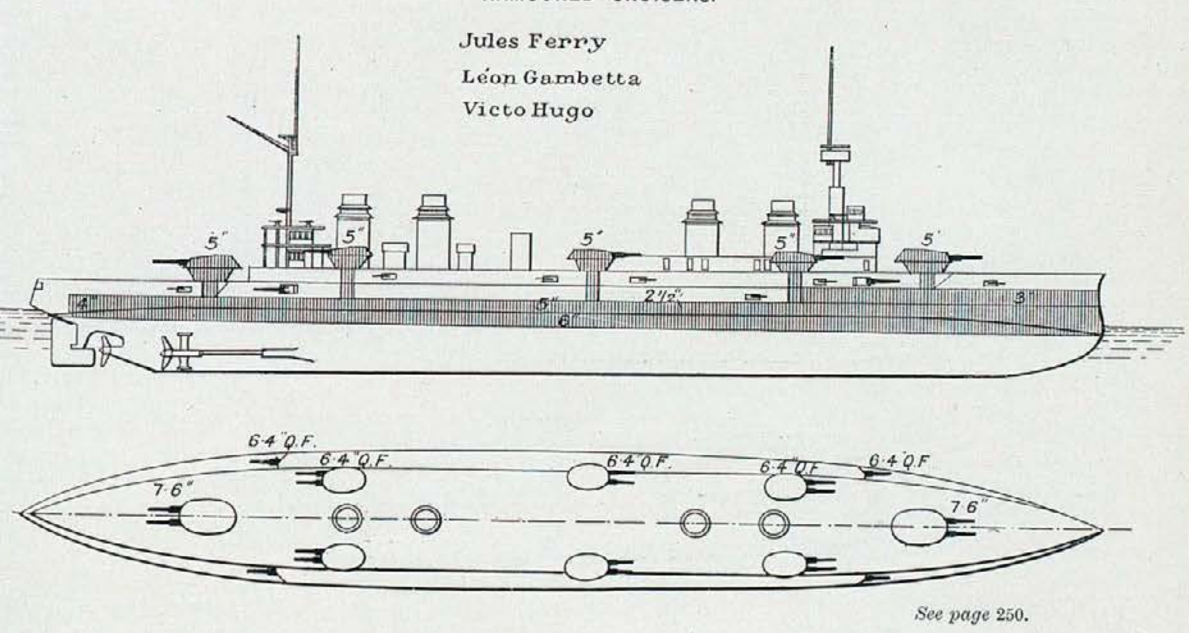
See page 249.

ARMOURED CRUISERS.

Jules Ferry

Léon Gambetta

Victo Hugo

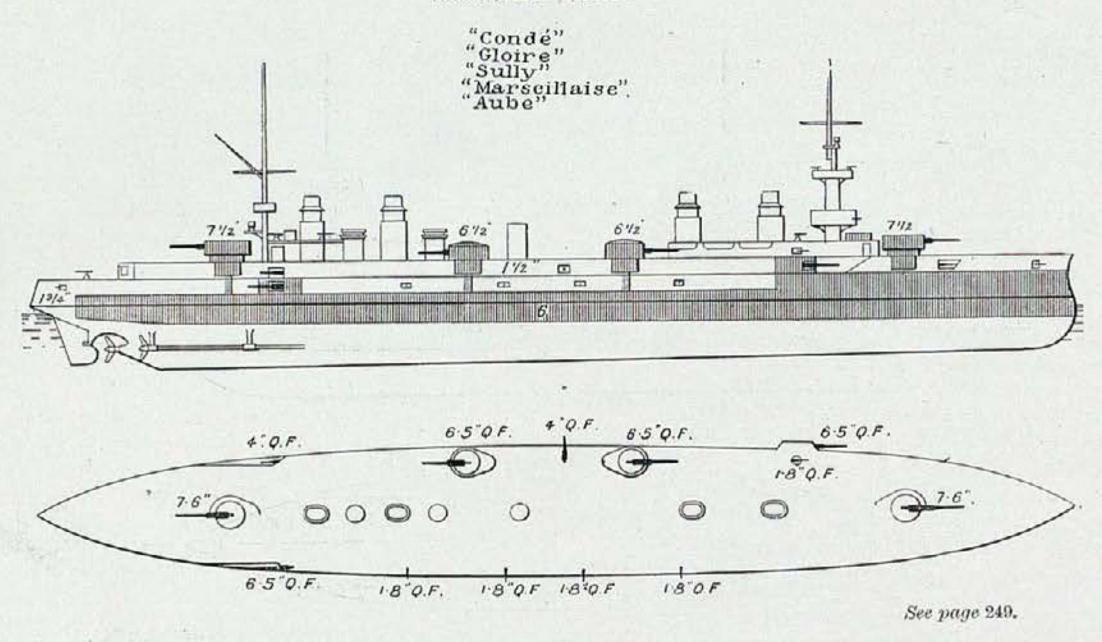


See page 250.

FRANCE.

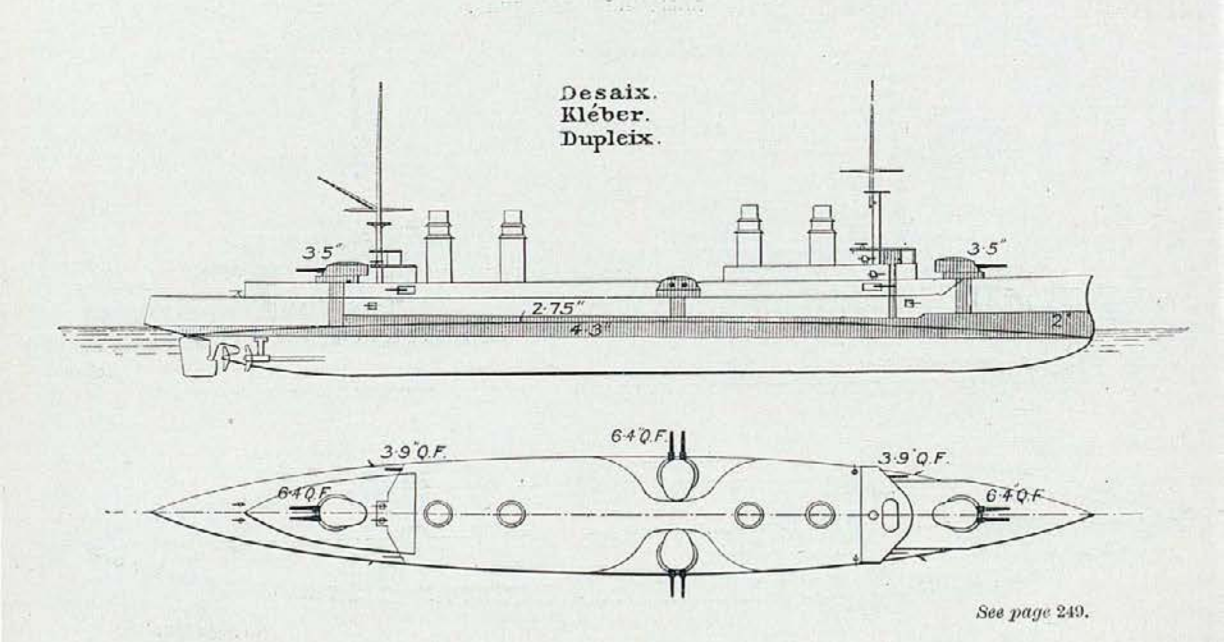
ARMOURED CRUISERS.

"Condé"
"Gloire"
"Sully"
"Marseillaise".
"Aube"



See page 249.

Desaix.
Kléber.
Dupleix.

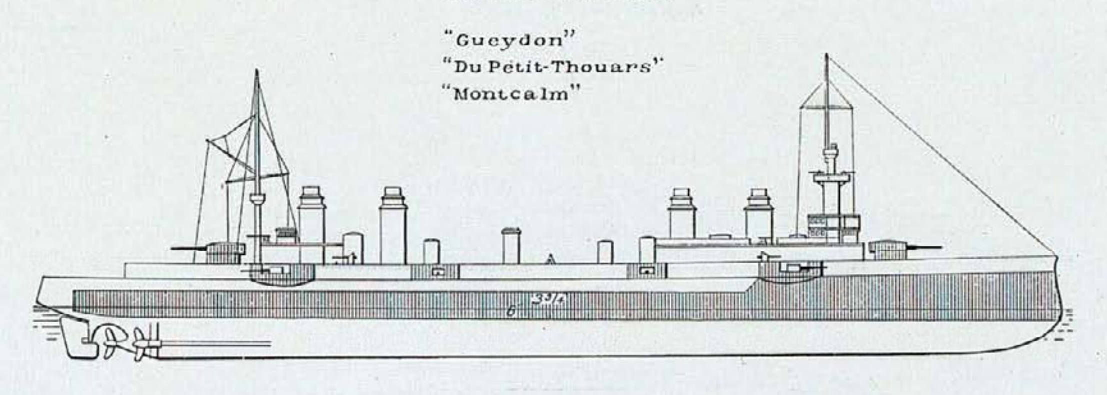


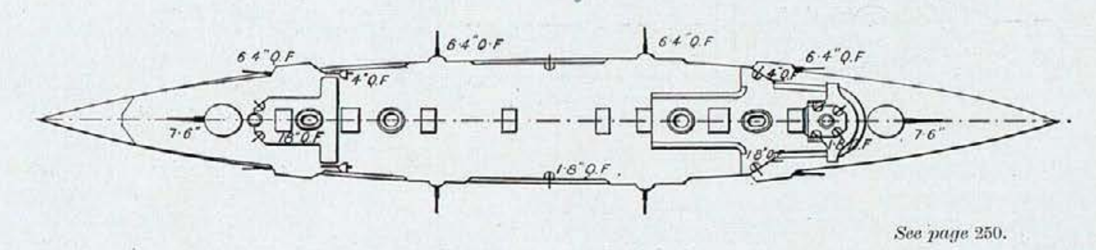
See page 249.

FRANCE.

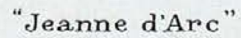
ARMOURED CRUISERS.

"Gueydon"
"Du Petit-Thouars"
"Montcalm"

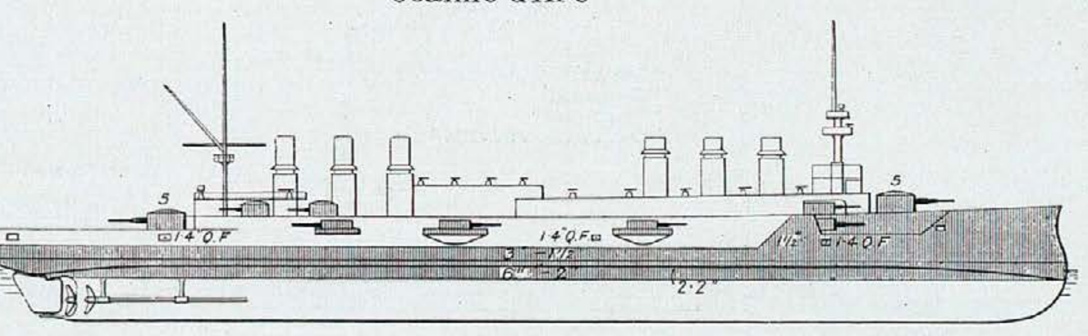


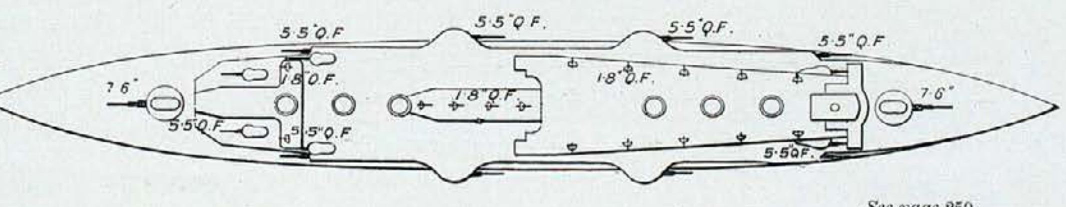


See page 250.



"Jeanne d'Arc"



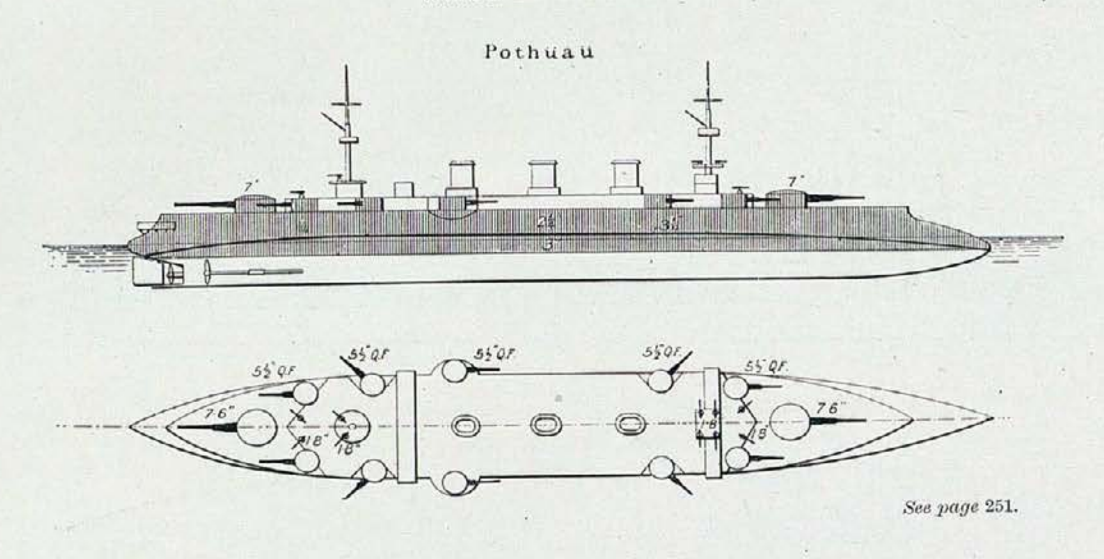


See page 250.

FRANCE.

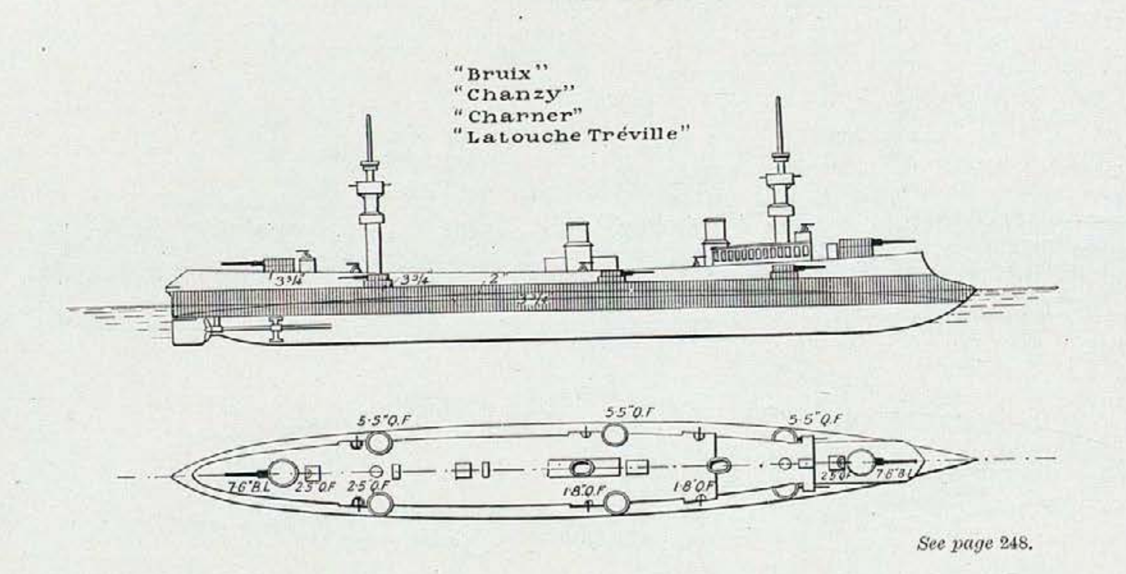
ARMOURED CRUISERS.

Pothuau



See page 251.

"Bruix"
"Chanzy"
"Charner"
"Latouche Tréville"

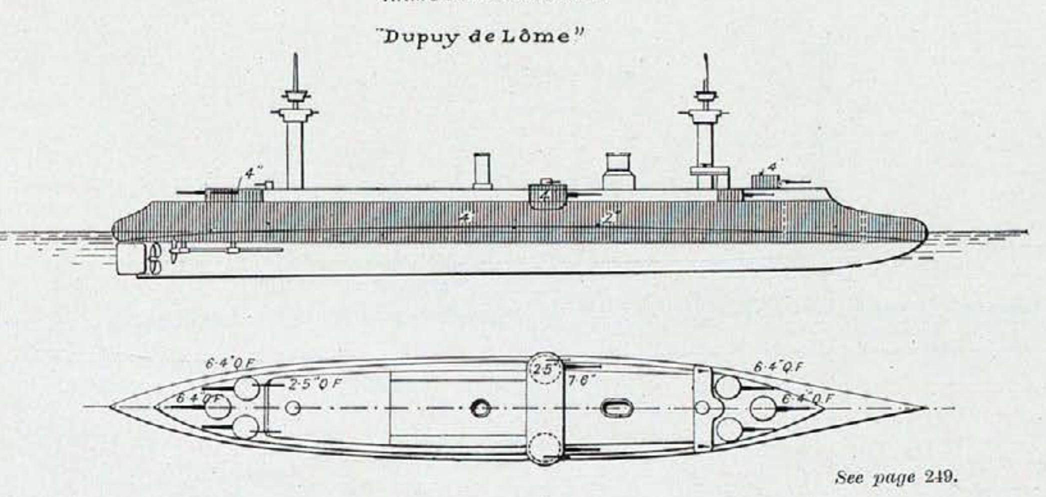


See page 248.

FRANCE.

ARMOURED CRUISER.

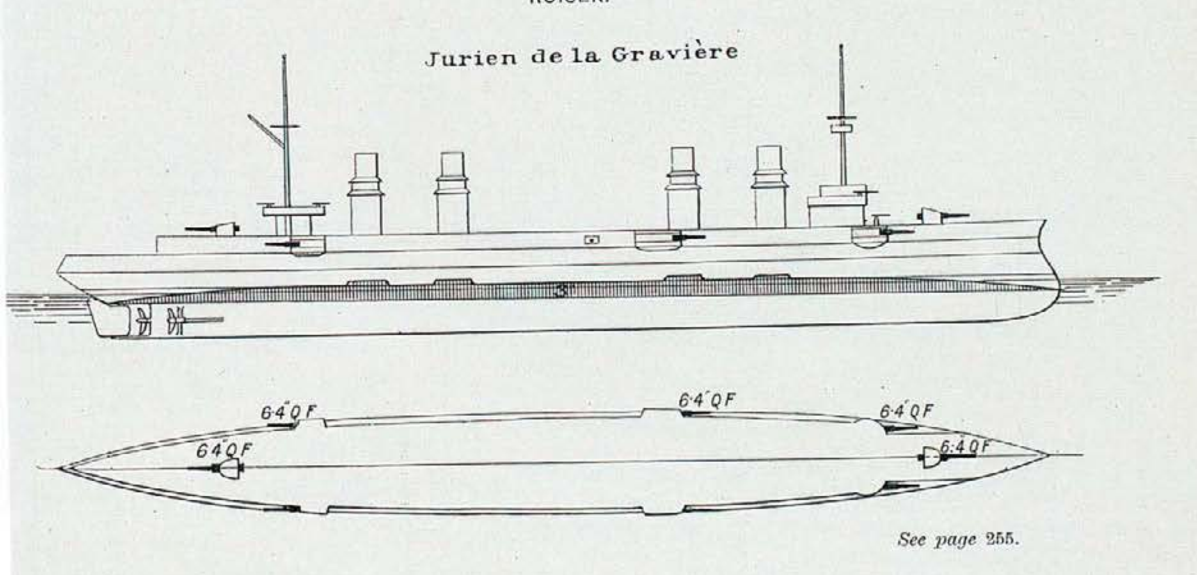
"Dupuy de Lôme"



See page 249.

RUISER.

Jurien de la Gravière

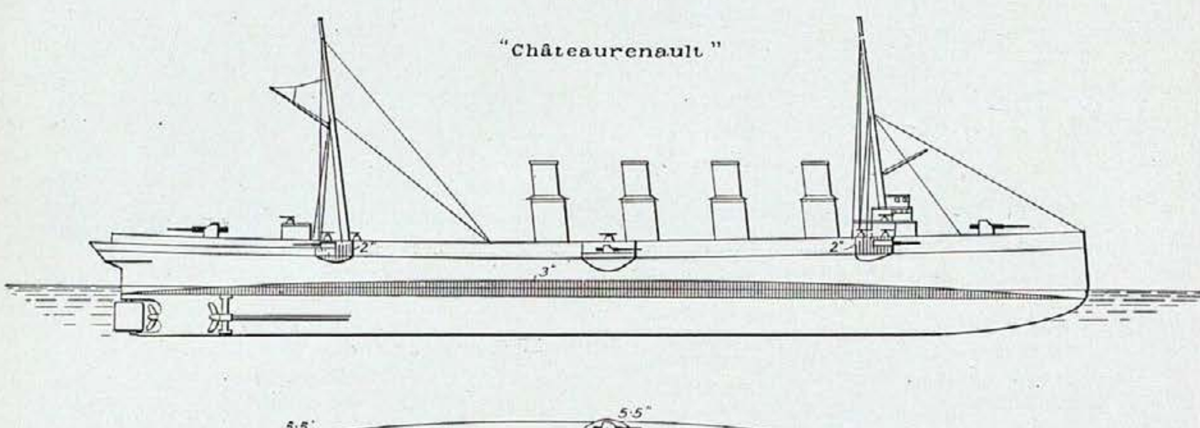


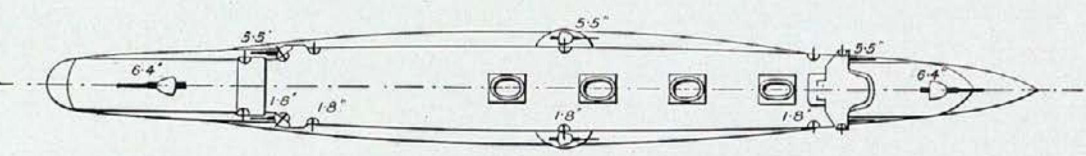
See page 255.

FRANCE.

CRUISERS.

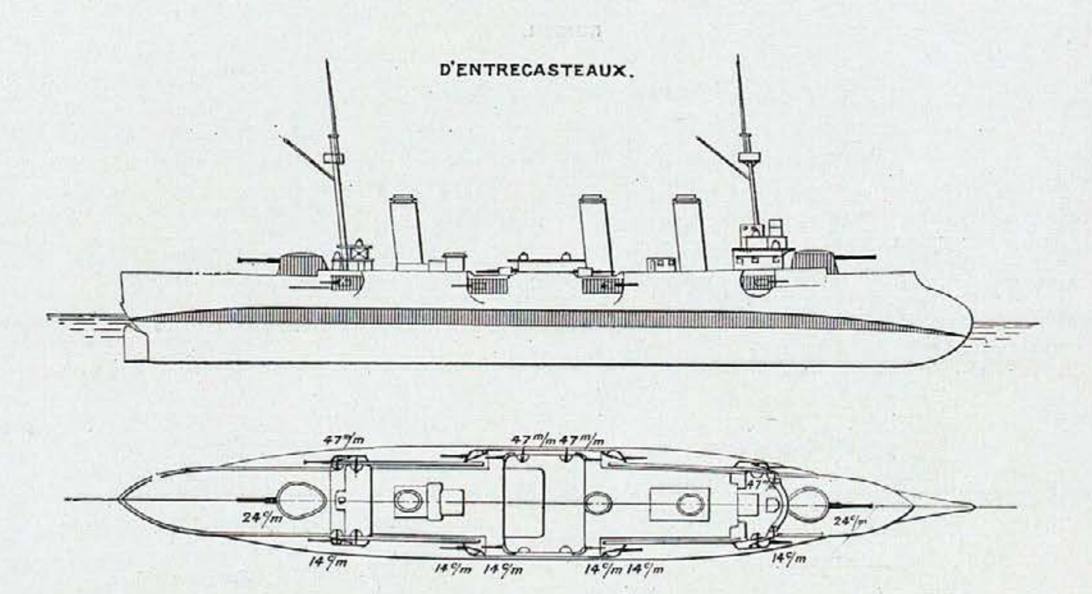
"Châteaurenault"





See page 253.

D'ENTRECASTEAUX.



See page 254.

GERMANY.

BATTLESHIPS,

Elsass
Hessen
Preussen
Braunschweig

12"
10"
10"
6·7
6·7
6"
9"
4"
4"
6·7"QF
6·7"QF
3·4"QF
3·4"QF
11"
11"
3·4"QF
3·4"QF
3·4"QF
3·4"QF
6·7"QF
6·7"QF
6·7"QF 6·7"QF 6·7"QF

See page 259

Wittlesbach.
Mecklenburg.
Schwaben.
Wettin.
Zähringen.

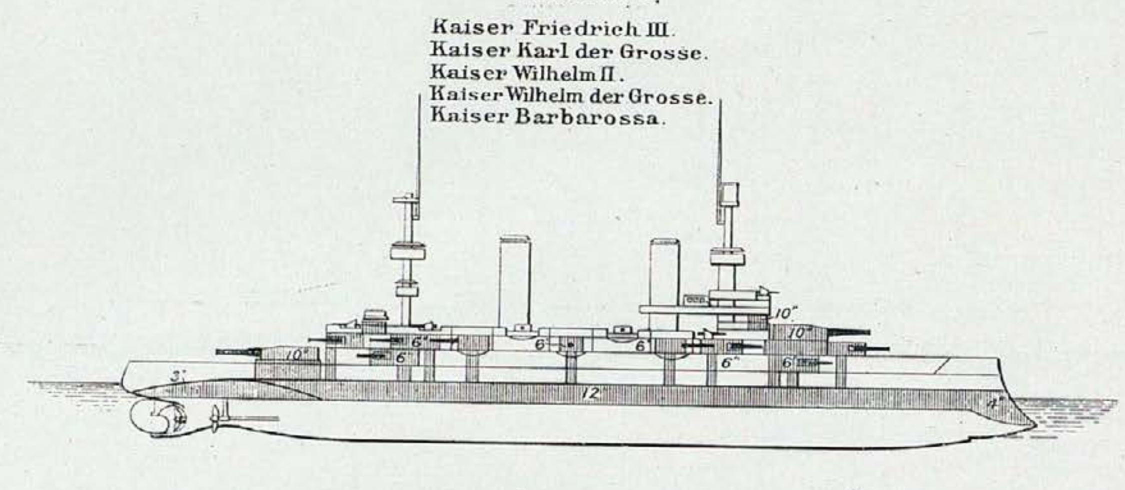
10"
10"
10"
6"
6"
5·5"
5·5"
9"
4"
4"
6"QF
3·4"QF
6"QF
3·4"QF
6"QF
6"QF
9·4"
3·4"QF
9·4"
6"QF
6"QF
6"QF
6"QF 6"QF

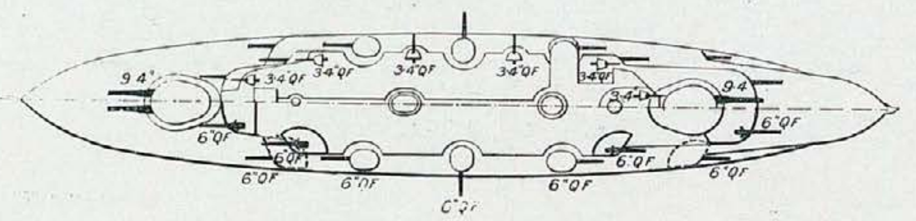
See page 261.

GERMANY.

BATTLESHIPS.

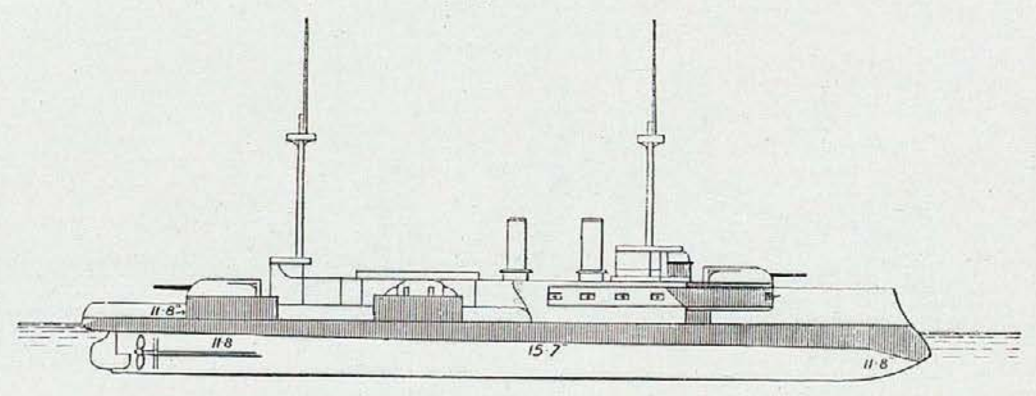
Kaiser Friedrich III.
Kaiser Karl der Grosse.
Kaiser Wilhelm II.
Kaiser Wilhelm der Grosse.
Kaiser Barbarossa.

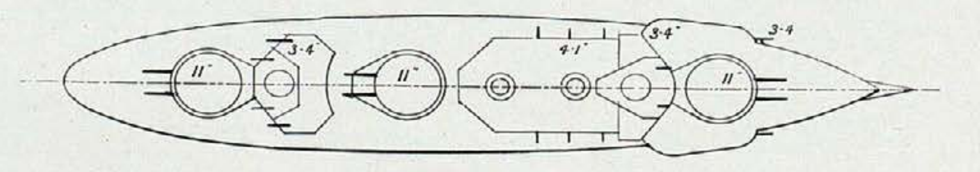




See page 260.

Kürfurst Friedrich Wilhelm.
Brandenburg.
Weissenburg.
Wörth





See page 260.

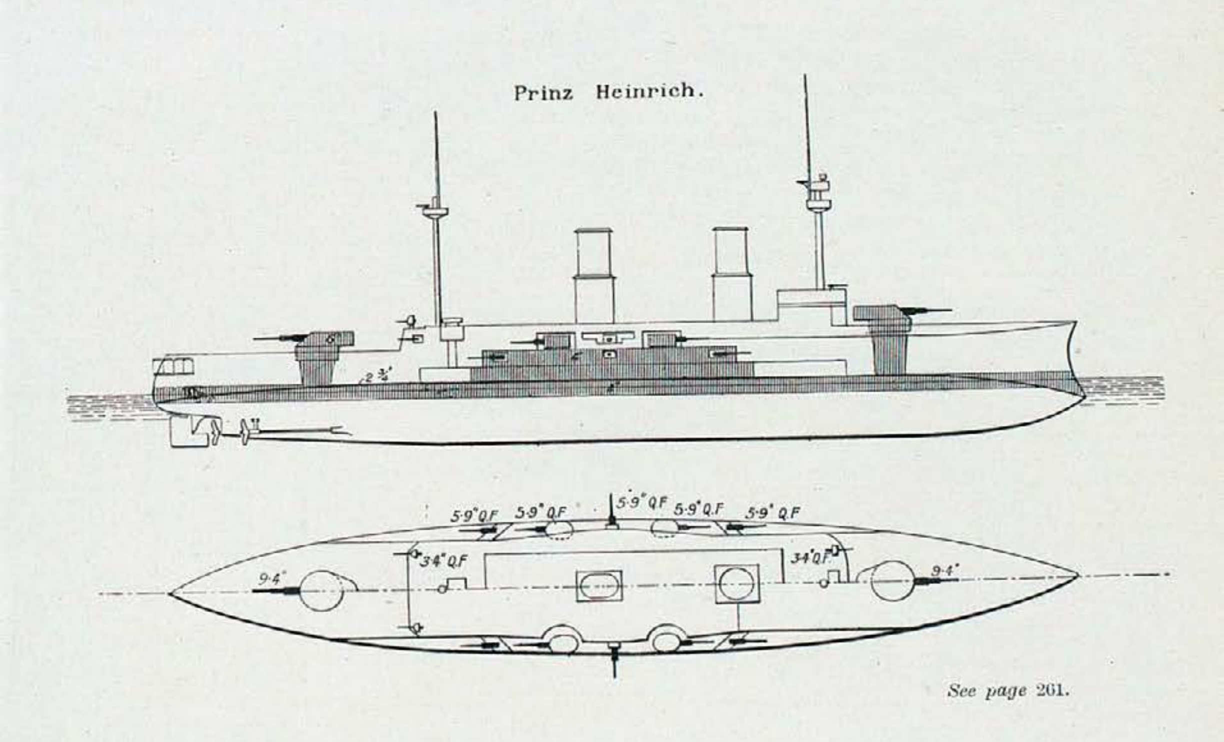
GERMANY.

ARMOURED CRUISERS.

Prinz Friedrich Karl
Prinz Adalbert
Ersatz Kaiser

See page 261.

Prinz Heinrich.

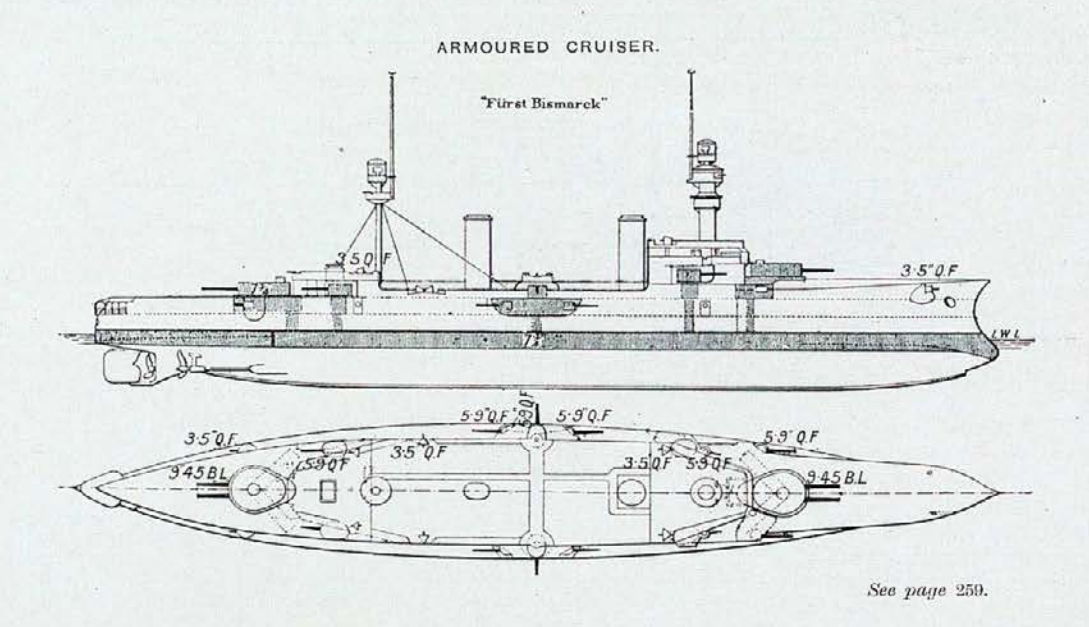


See page 261.

GERMANY.

ARMOURED CRUISER.

"Fürst Bismarck"

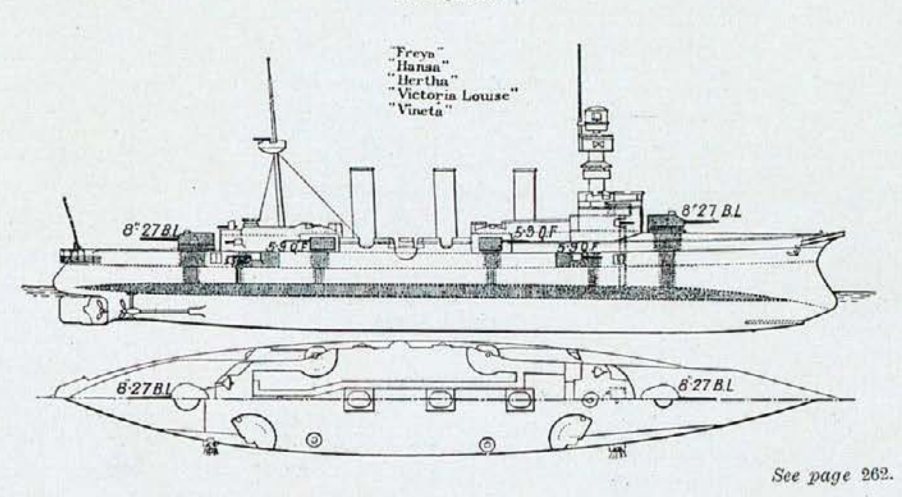


See page 259.

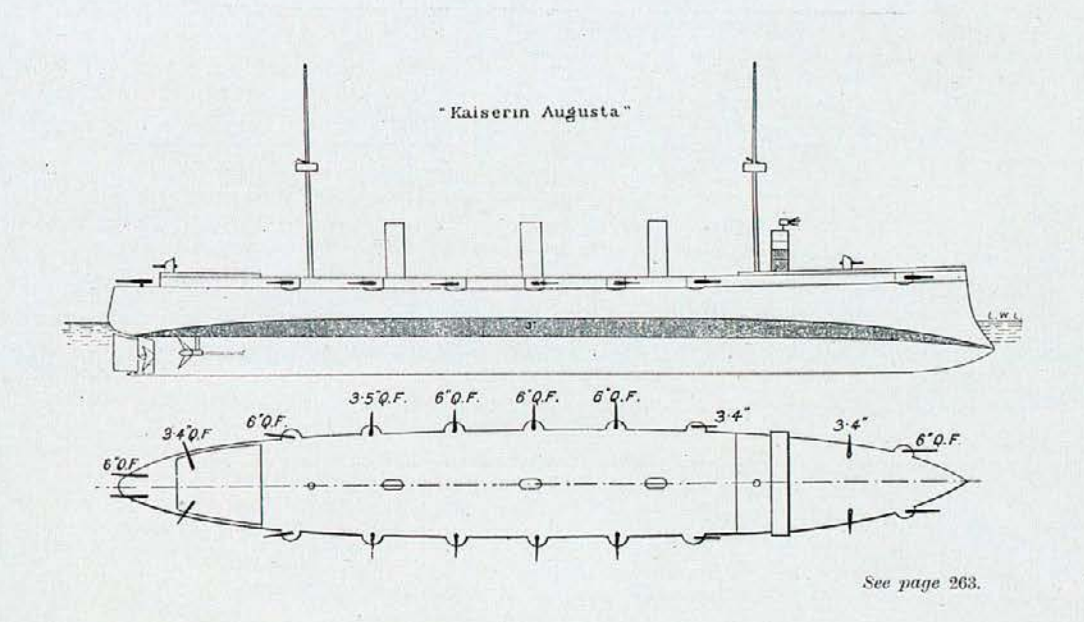
PLATE 38.

GERMANY.

CRUISERS.



See page 262.

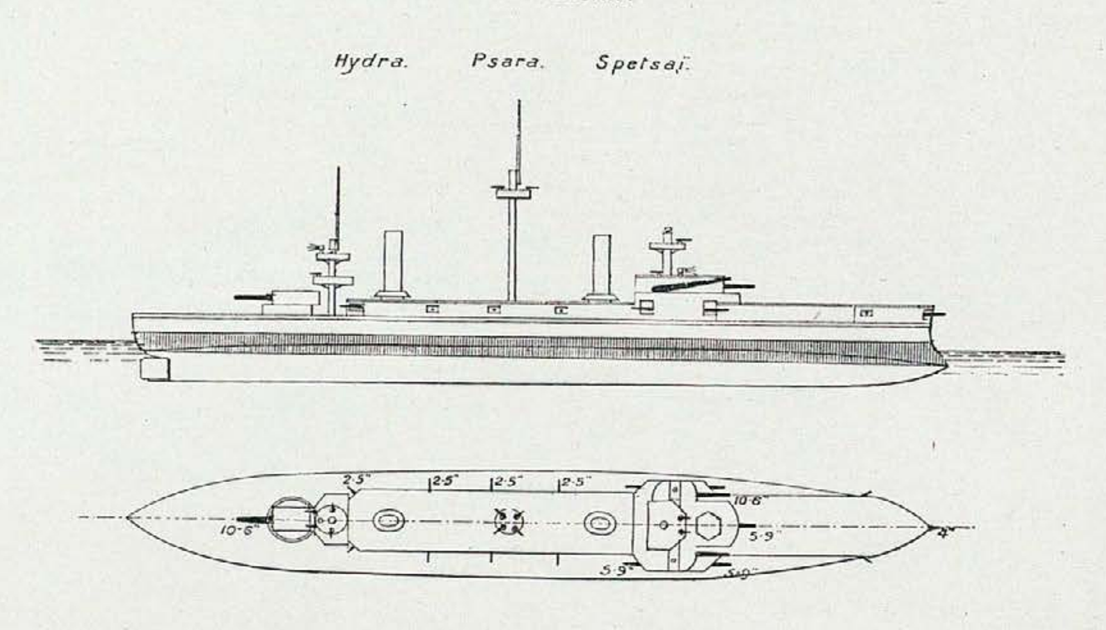


See page 263.

GREECE.

BATTLESHIP.

Hydra. Psara. Spetsai.

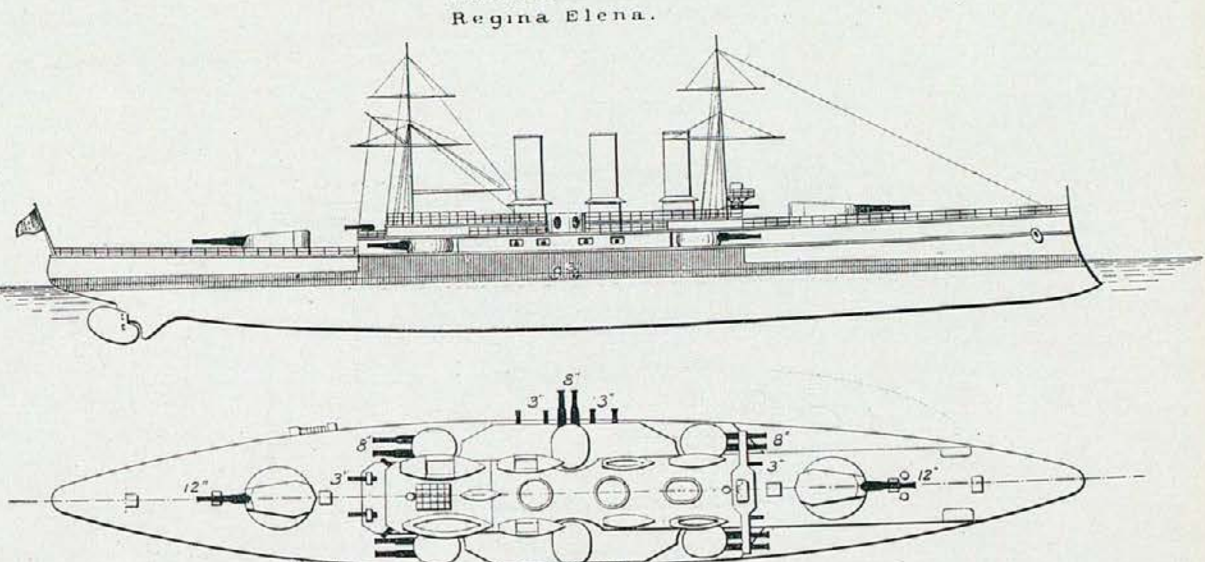


See page 266.

ITALY.

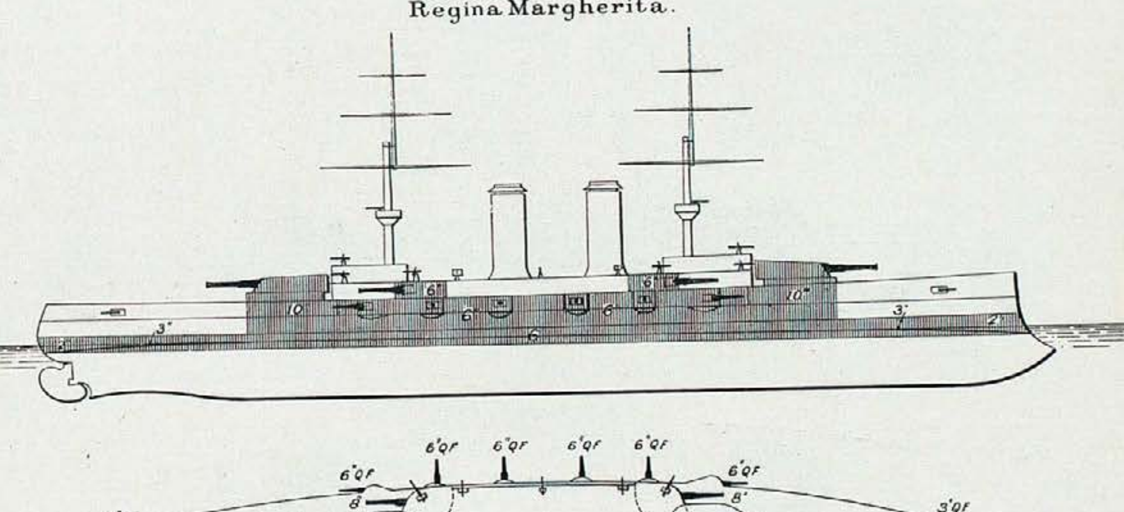
BATTLESHIPS.

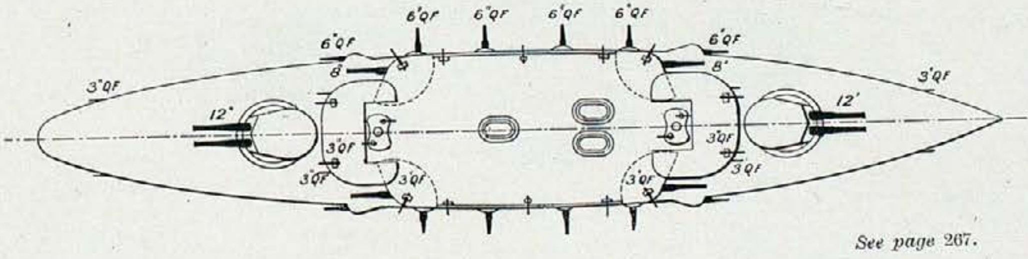
Vittorio Emanuele
Regina Elena.



See page 268.

Benedetto Brin.
Regina Margherita.



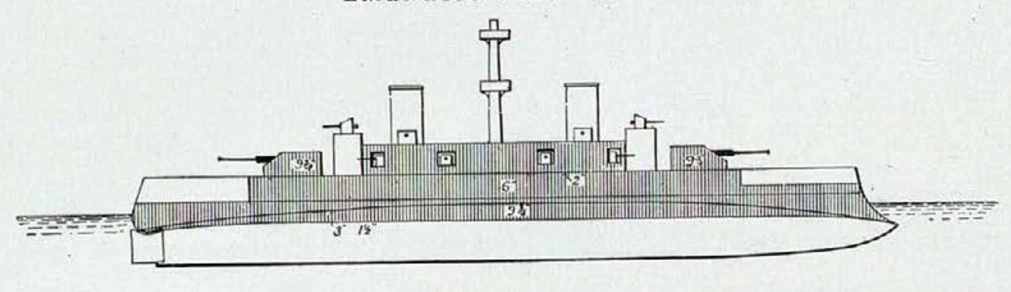


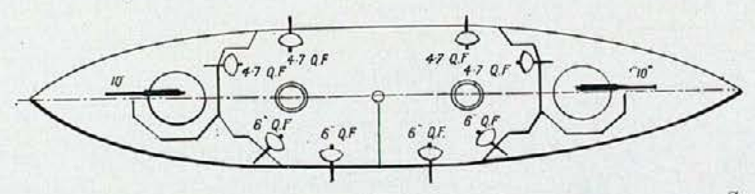
See page 267.

ITALY.

BATTLESHIPS.

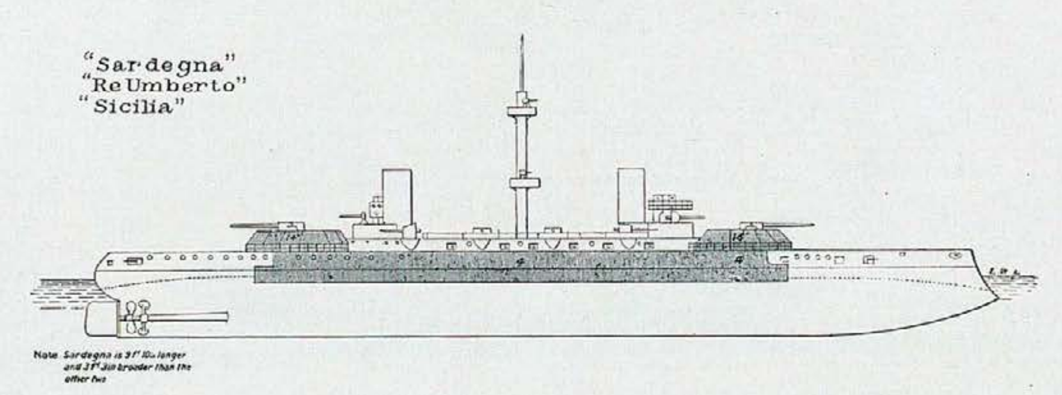
Ammiraglio Di St. Bon. Emanuele Filiberto

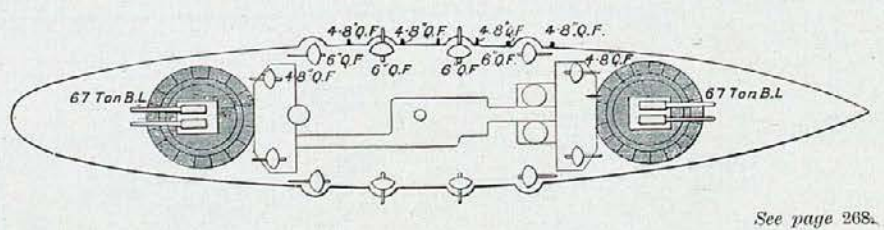




See page 267.

"Sardegna" "Re Umberto" "Sicilia"





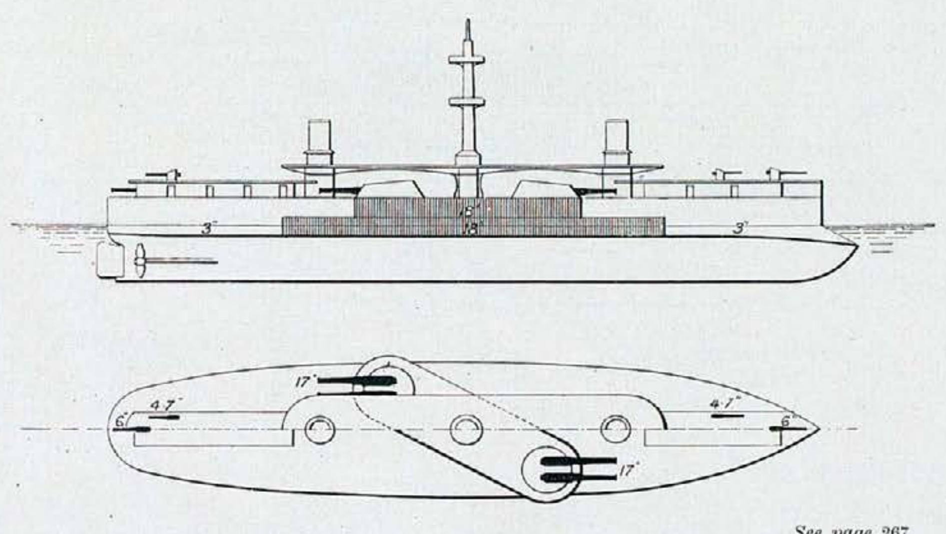
See page 268.

Plate 42.

ITALY.

BATTLESHIPS.

Andrea Doria.
Francesco Morosini.
Ruggiero di Lauria.



See page 267.

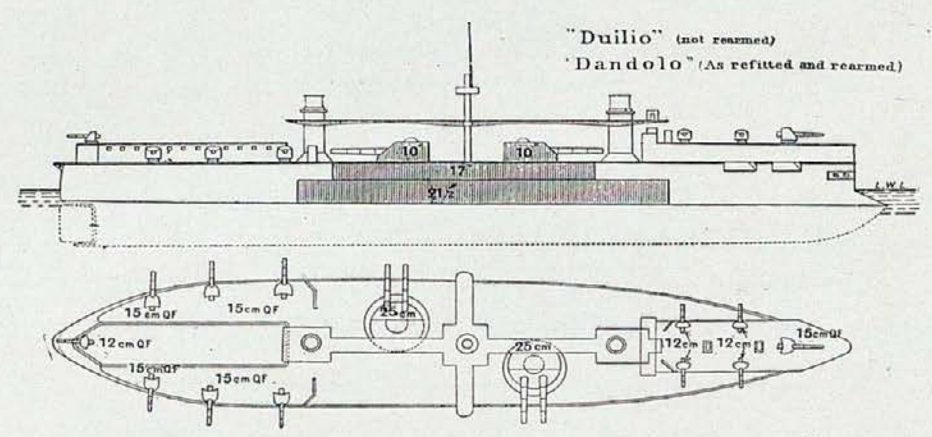
Italia.
Lepanto.

See page 207.

ITALY.

BATTLESHIP.

"Duilio" (not rearmed)
"Dandolo" (As refitted and rearmed)

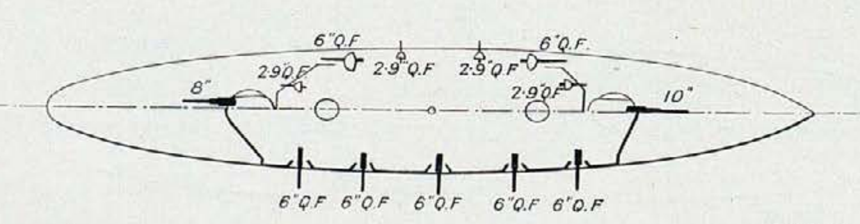


See page 267.

ARMOURED CRUISER.

Guiseppe Garibaldi
Varese.
Francesco Ferrucio

6"
6"
6"
17½"
6"
4.5
4.5



See page 267.

ITALY.

ARMOURED CRUISERS.

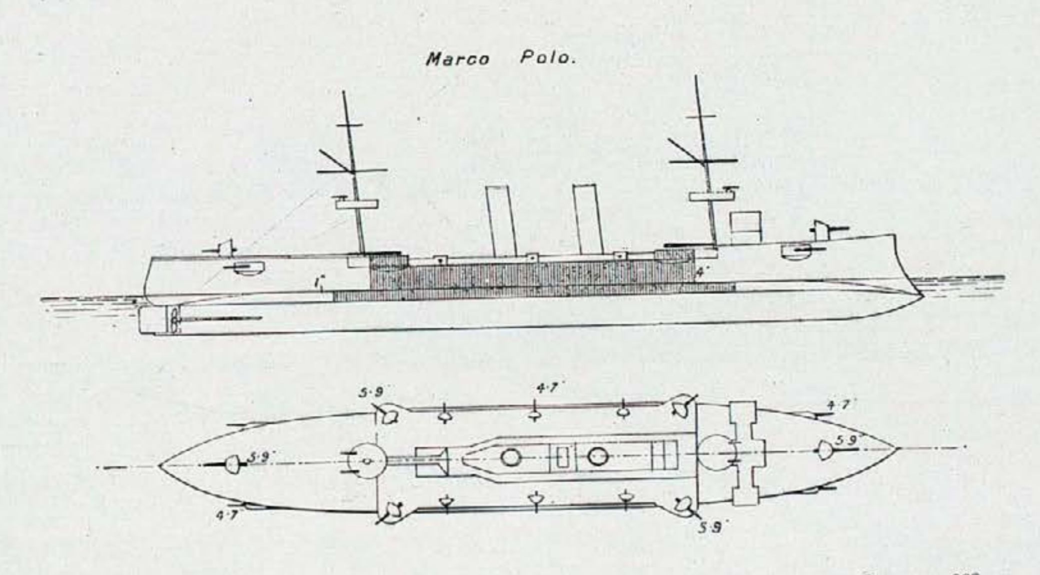
"Carlo Alberto"
"Vettor Pisani"

6"
4½"
6"

6"Q.F
4.7"Q.F
4.7"Q.F
6"Q.F.
4.7"Q.F
4.7 Q.F.
2.9"Q.F
6"Q.F
6"Q.F
6"Q.F
6"Q.F

See page 267.

Marco Polo.

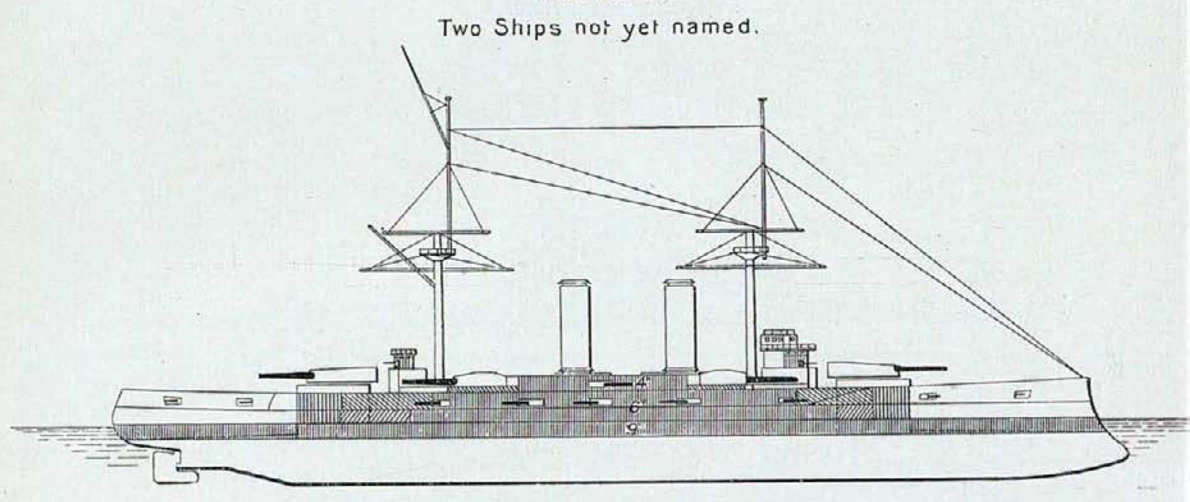


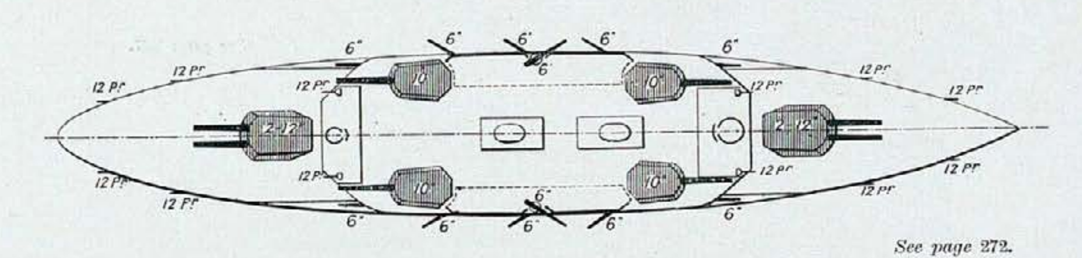
See page 268

JAPAN.

BATTLESHIPS.

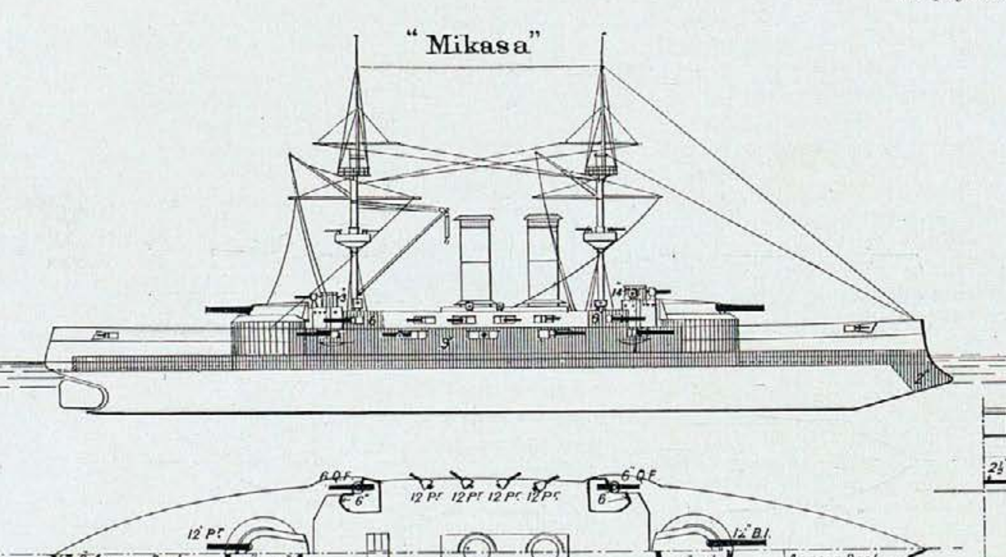
Two Ships not yet named.





See page 272.

"Mikasa"

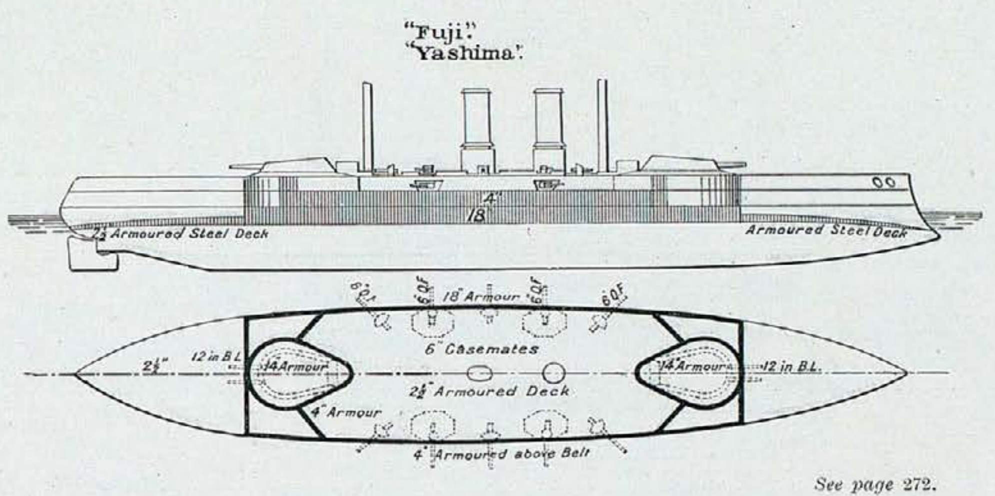


See page 272.

JAPAN.

BATTLESHIPS.

"Fuji."
"Yashima."




See page 272.

Hatsuse.
Asahi.
Shikishima

3 Pr
3 Pr
14"
10"
14"
6"
6"
6"
6"
6"
10"
14"
14"
14"
6"
9"
4"
4"
6" QF
6" QF
6" QF
6" QF
6" QF
6" QF
6" QF
12 Pr
12 Pr
12 Pr
12 Pr
12 Pr
2½ Pr
2½ Pr
12 Pr
12 Pr
12 Pr
12 Pr
12"
3 Pr
3 Pr
12"

The "Asahi" has but two funnels.

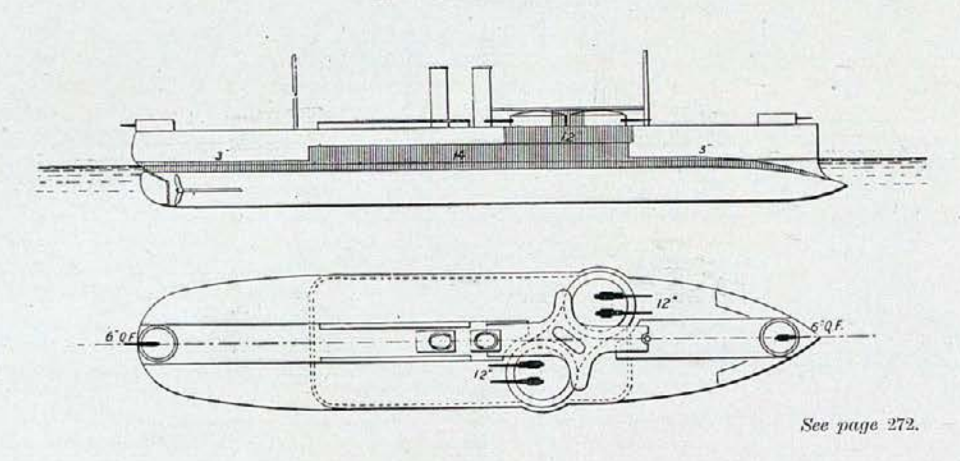
See page 272.

e

JAPAN.

BATTLESHIP.

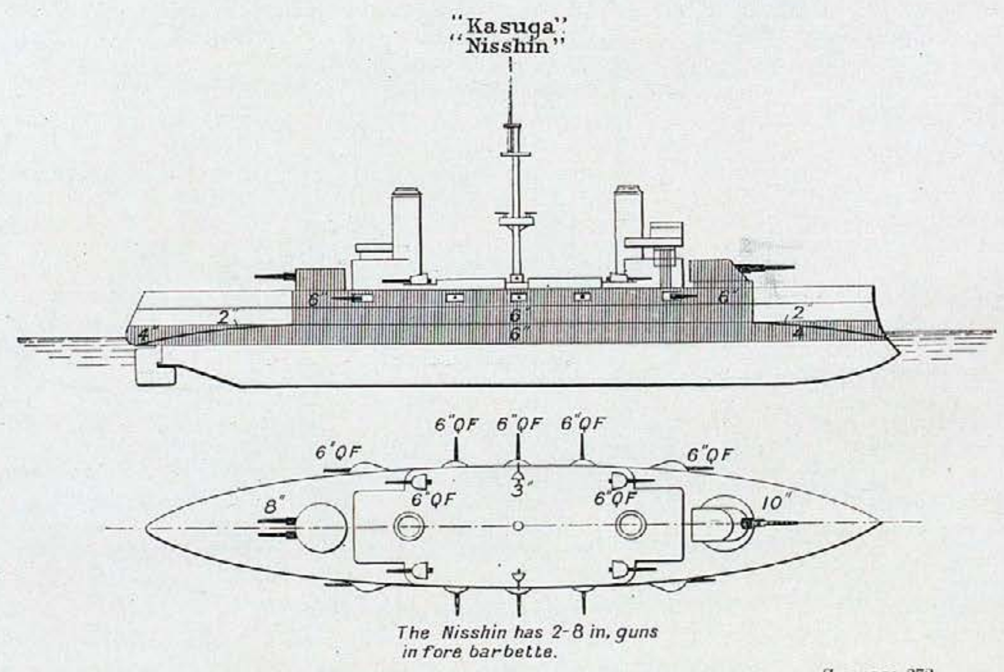
Chin Yuen.



See page 272.

ARMOURED CRUISER.

"Kasuga"
"Nisshin"



The Nisshin has 2-8 in. guns in fore barbette.

See page 272.

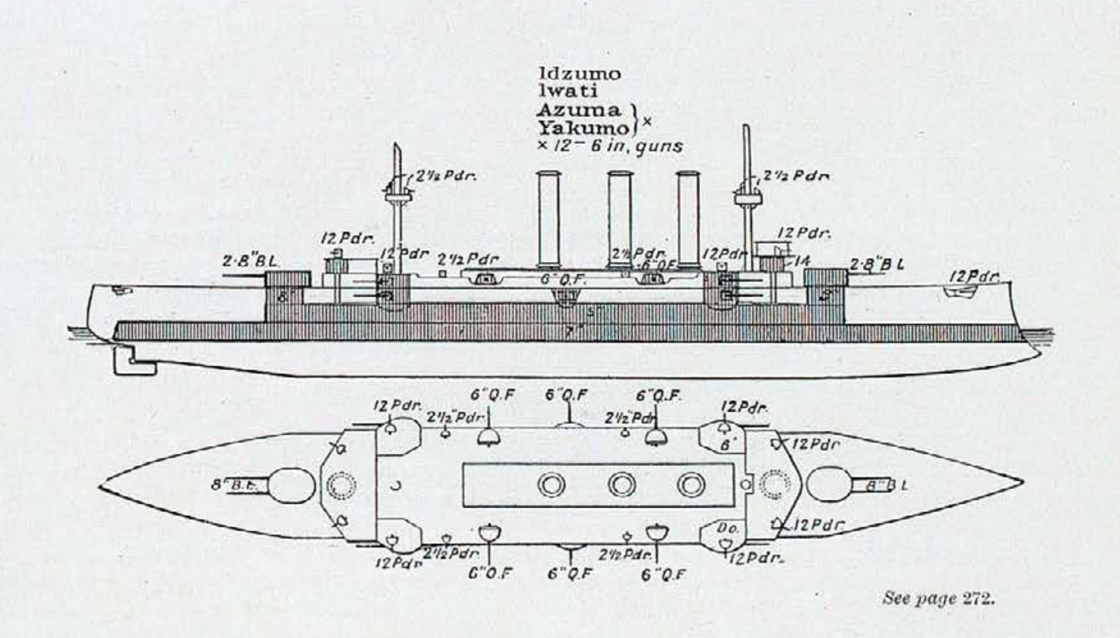
JAPAN.

ARMOURED CRUISERS.

Asama and Tokiwa

6"
6"
5"
7"
3½"
6" Q.F.
6" Q.F.
6" Q.F.
6" Q.F.
6" Q.F.
2·8" Q.F.
2·8" Q.F.

See page 272.

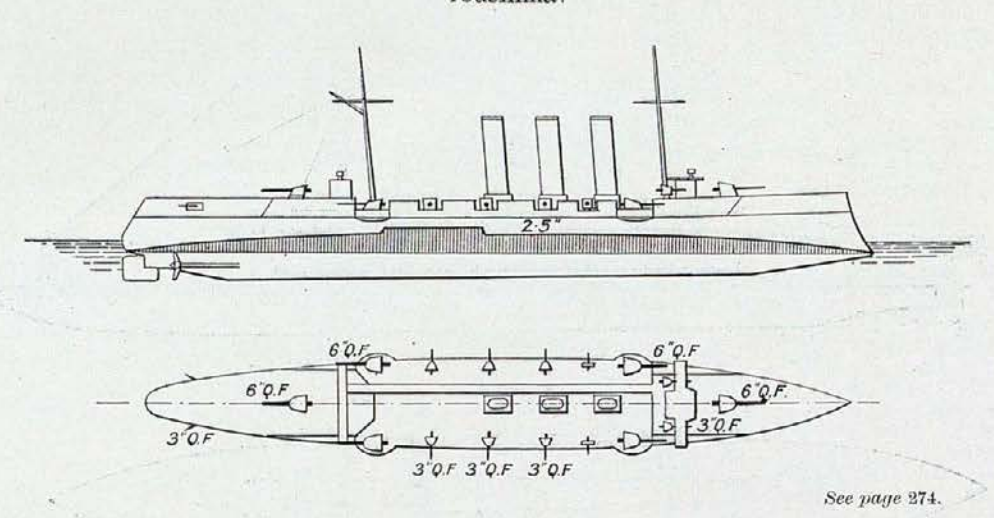


See page 272.

JAPAN.

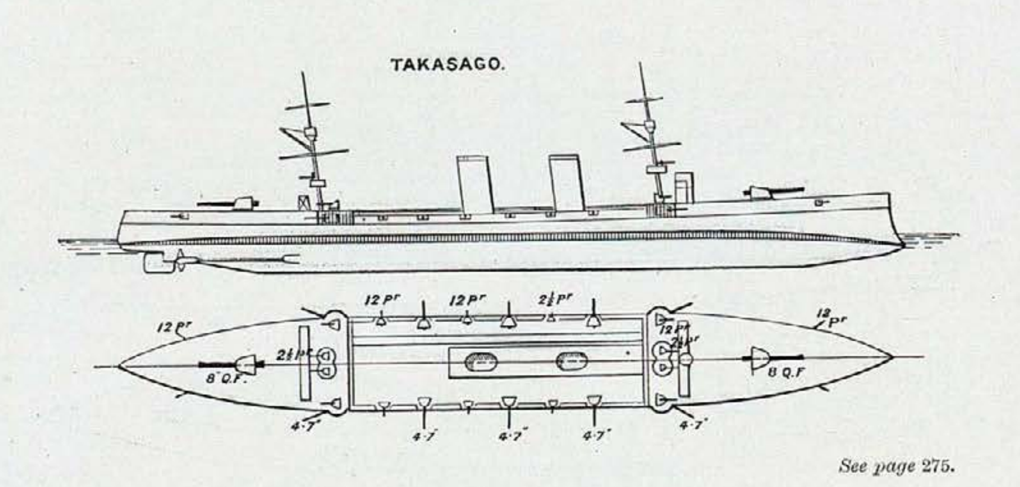
CRUISERS.

Niitaka.
Tsushima.



See page 274.

TAKASAGO.

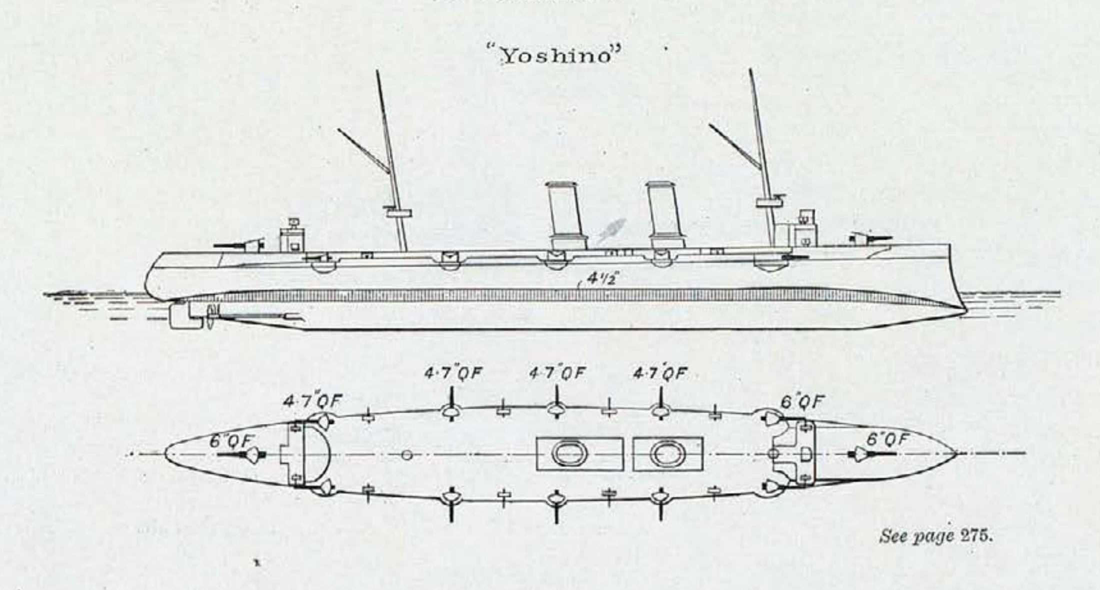


See page 275.

JAPAN.

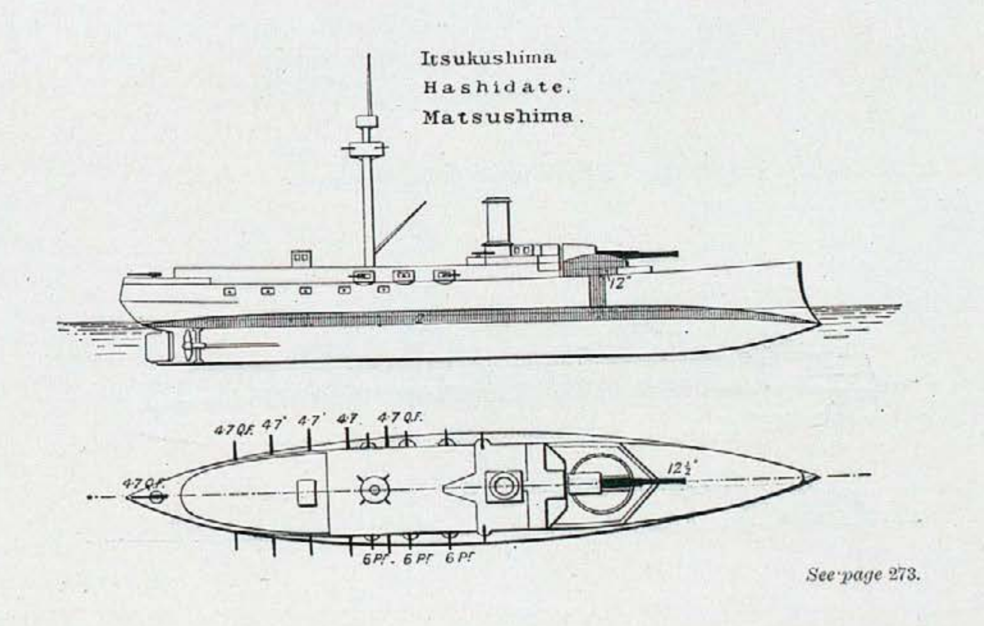
CRUISERS.

"Yoshino"



See page 275.

Itsukushima
Hashidate.
Matsushima.

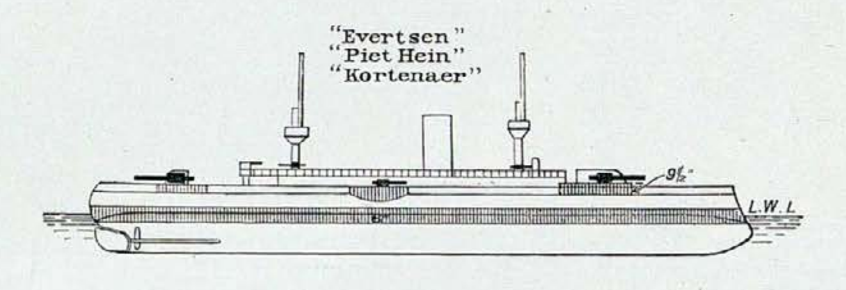


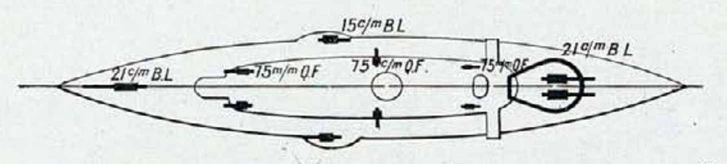
See page 273.

NETHERLANDS.

COAST DEFENCE SHIP.

"Evertsen"
"Piet Hein"
"Kortenaer"

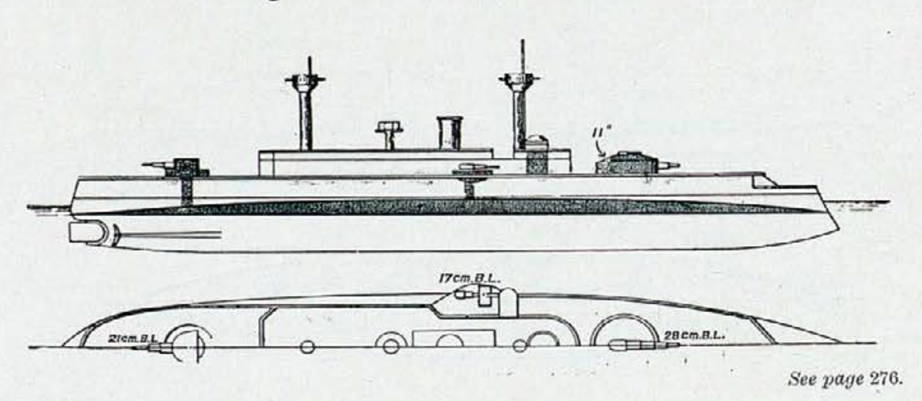




See page 276.

BATTLESHIP.

Koningin Wilhelmina der Nederlanden.

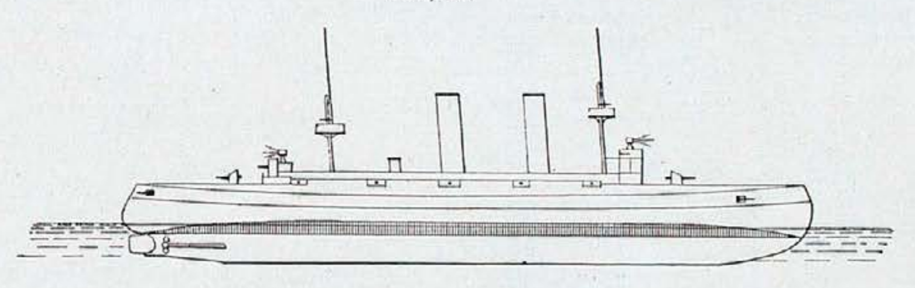


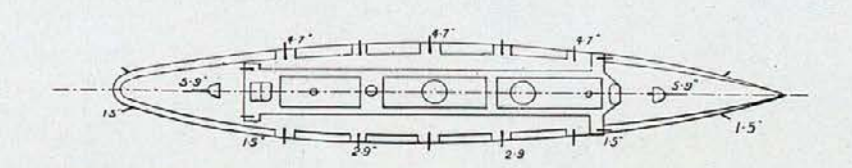
See page 276.

NETHERLANDS.

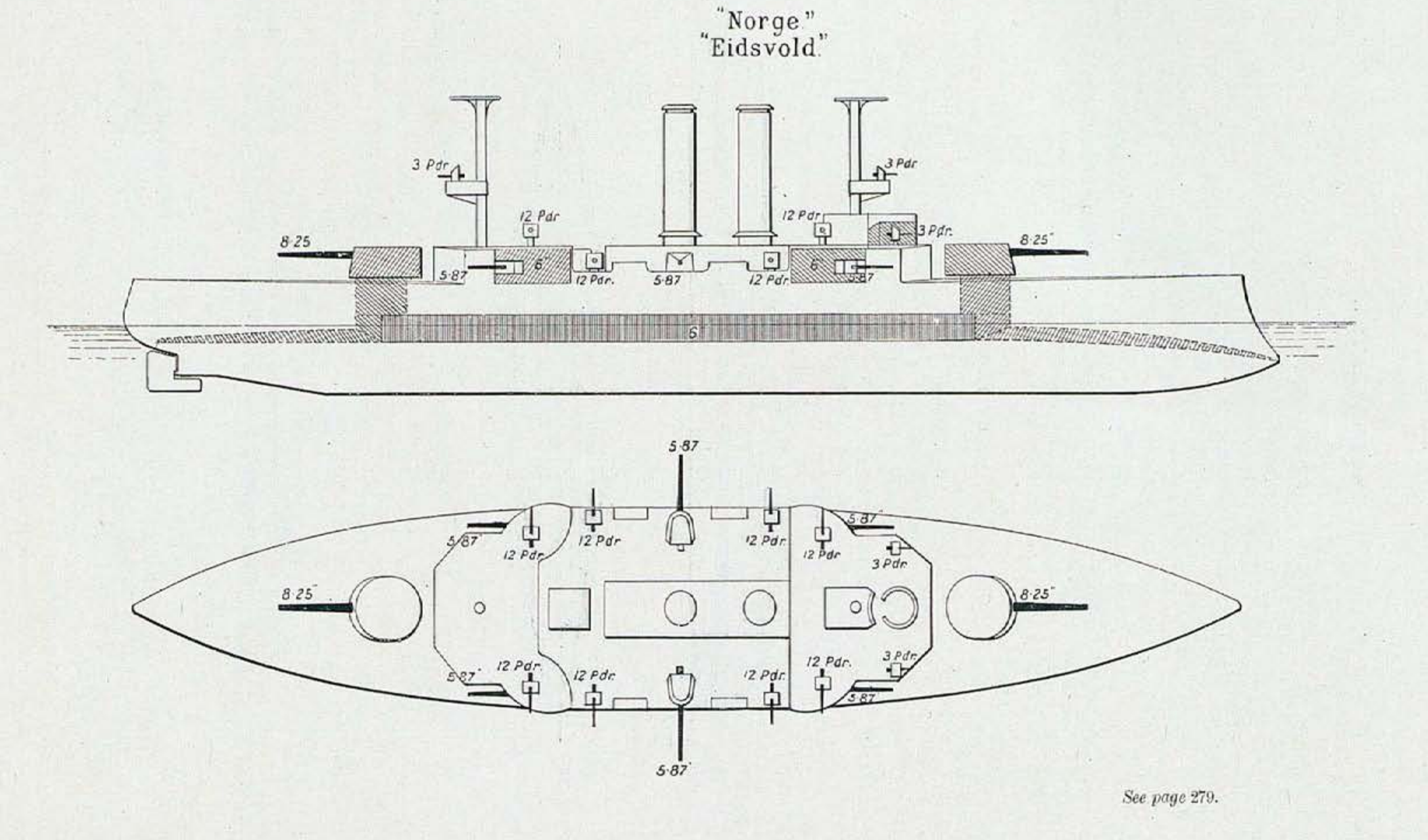
CRUISER.

Holland.





See page 277.



See page 279.

PLATE 54.

RUSSIA.

BATTLESHIPS.

"Borodino"
"Imp. Alexander III"
"Kniaz Souvaroff"
"Orel"
"Slava"

See page 282.

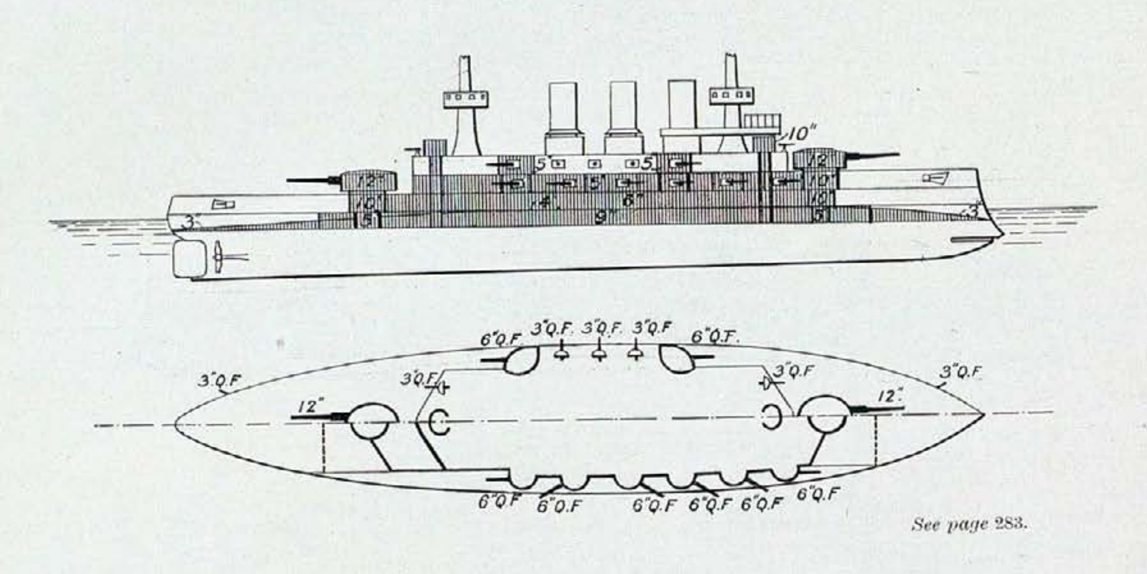
Cesarevitch.

See page 283.

RUSSIA.

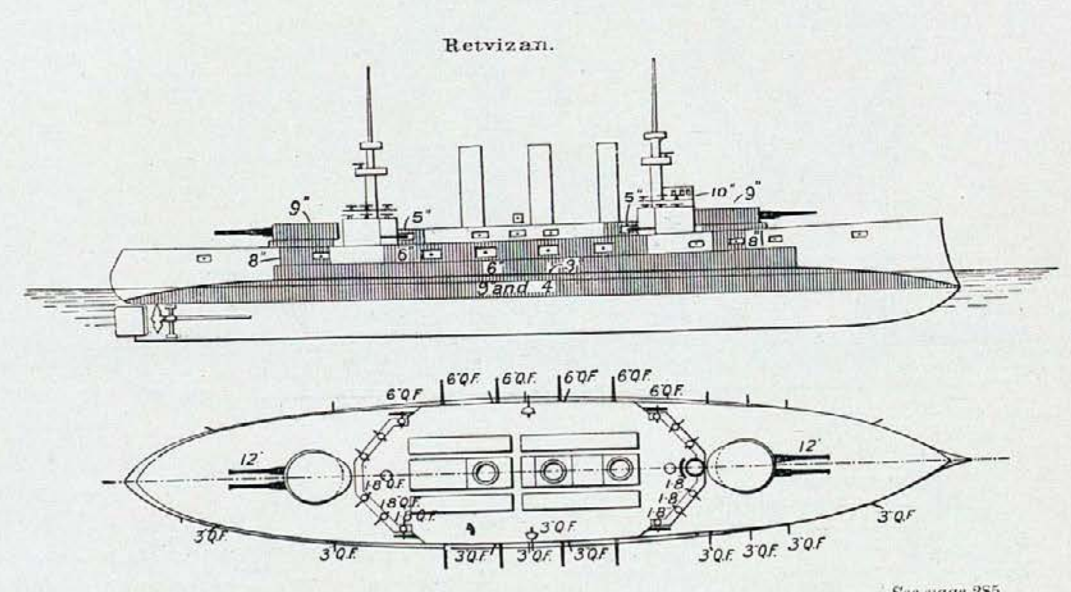
BATTLESHIPS.

Kniaz Potemkin Tavritchesky



See page 283.

Retvizan.



See page 285.

RUSSIA.

BATTLESHIPS.

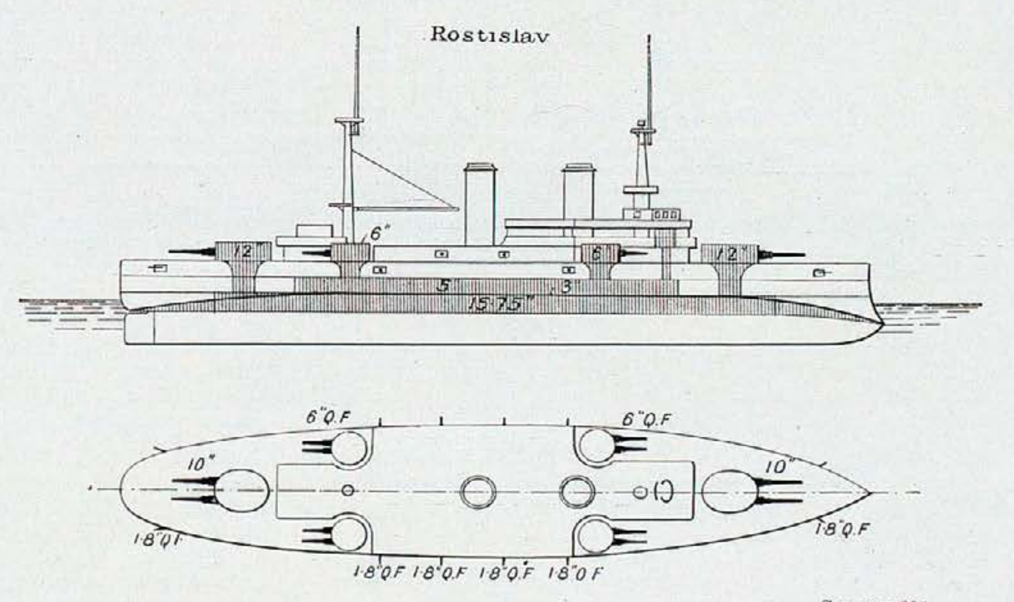
"Oslabya"
"Peresviet"
"Pobieda"

9" 8" 5" 5" 9" 8" 2 3/4" 9" 2 3/4"

6" Q.F. 3" Q.F 3" Q.F. 6" Q.F 3" Q.F. 3" Q.F. 6" Q.F 3" Q.F 3" Q.F 10" 3" Q.F 10" 6" Q.F. 3" Q.F. 3" Q.F. 3" Q.F. 6" Q.F. 3" Q.F 3" Q.F 6" Q.F.

Note: In the "Pobieda" the Belt Extends the Full Length of the Ship.

See page 284.

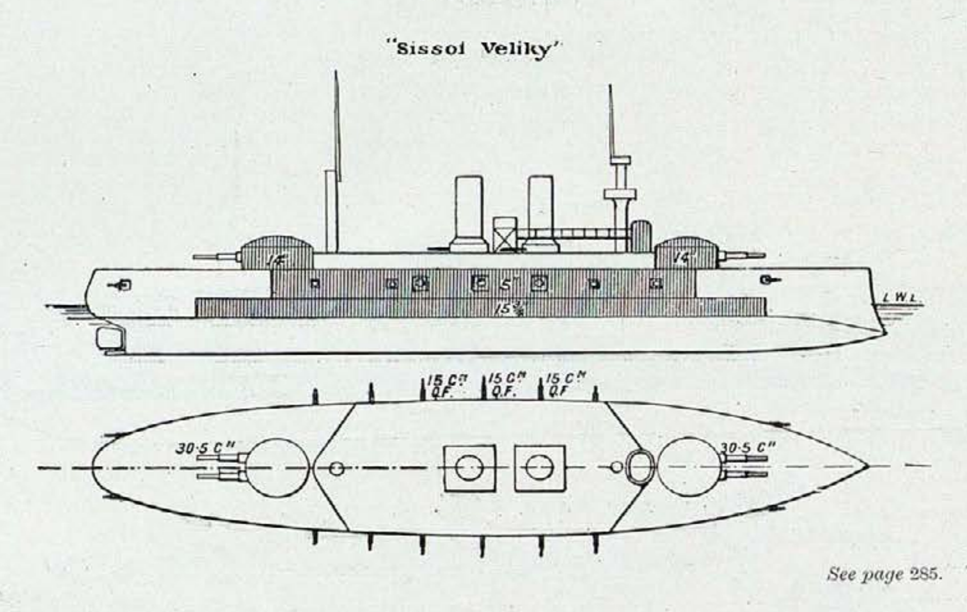


See page 285.

RUSSIA

BATTLESHIPS.

"Sissoi Veliky"



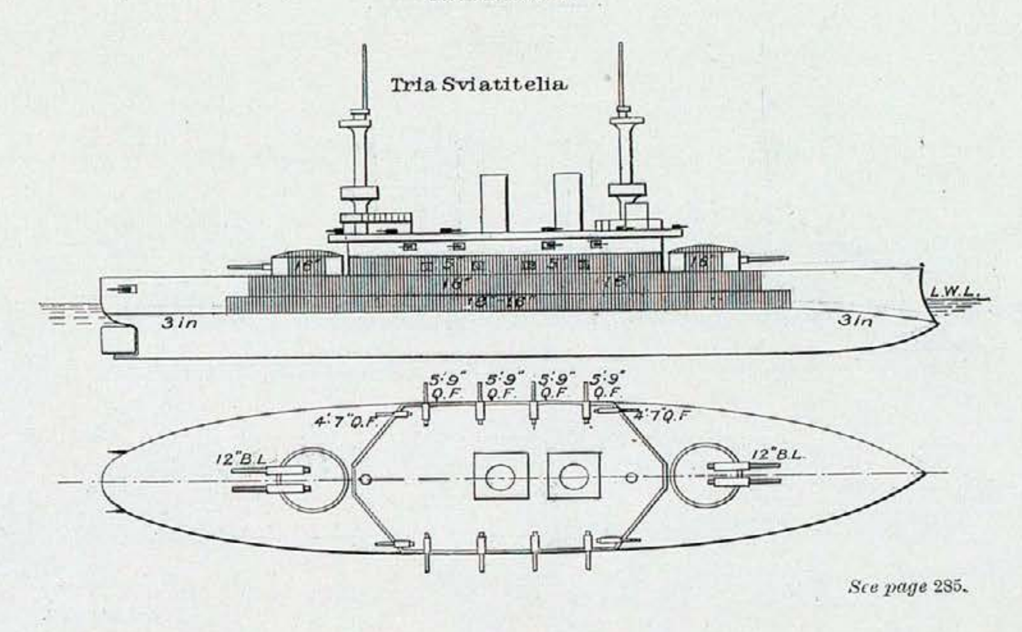
See page 285.

PETROPAVLOVSK (Sunk)
POLTAVA
SEVASTOPOL

See page 284.

RUSSIA.

BATTLESHIPS.



See page 285.

Catherine II
Tchesmé
Sinope
Georgi Pobiedonosetz

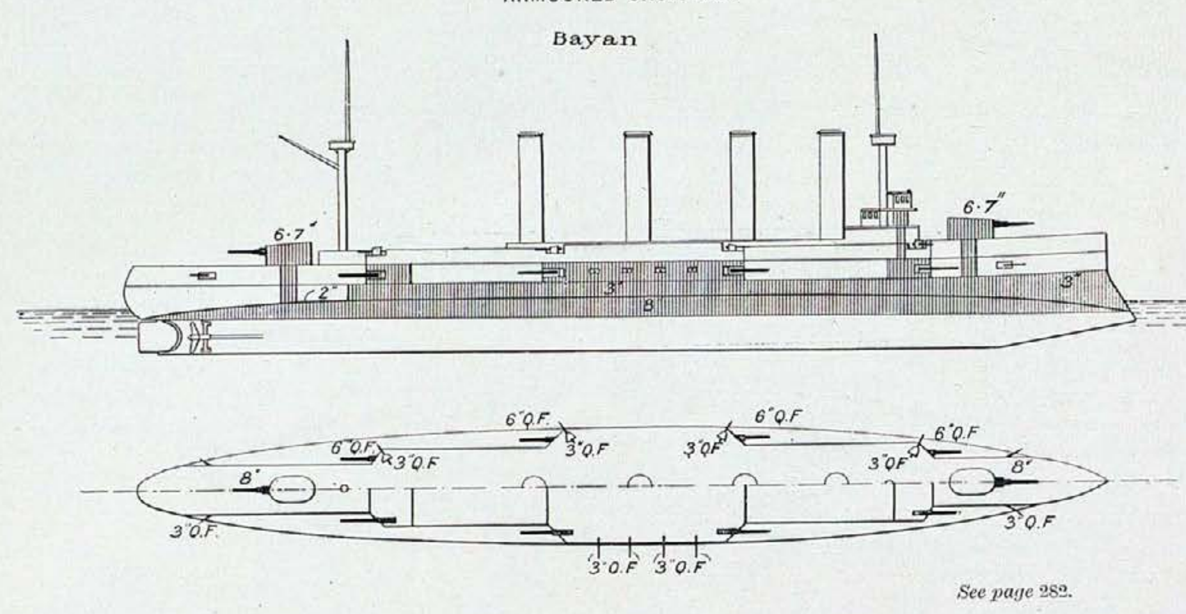
14"
16"
3"
6" Q.F.
12"

See page 282.

RUSSIA.

ARMOURED CRUISERS.

Bayan



See page 282.

"Gromoboi".

1·8"Q.F.

4·7

6"

3"

3"

8"

3"Q.F

3"Q.F.

3"Q.F.

3"Q.F.

3"Q.F

8"

6"Q.F.

3"Q.F.

3"Q.F.

6"Q.F.

1·8"Q.F

6"Q

6"Q.F

6"Q.F.

6"Q.F.

6"Q.F

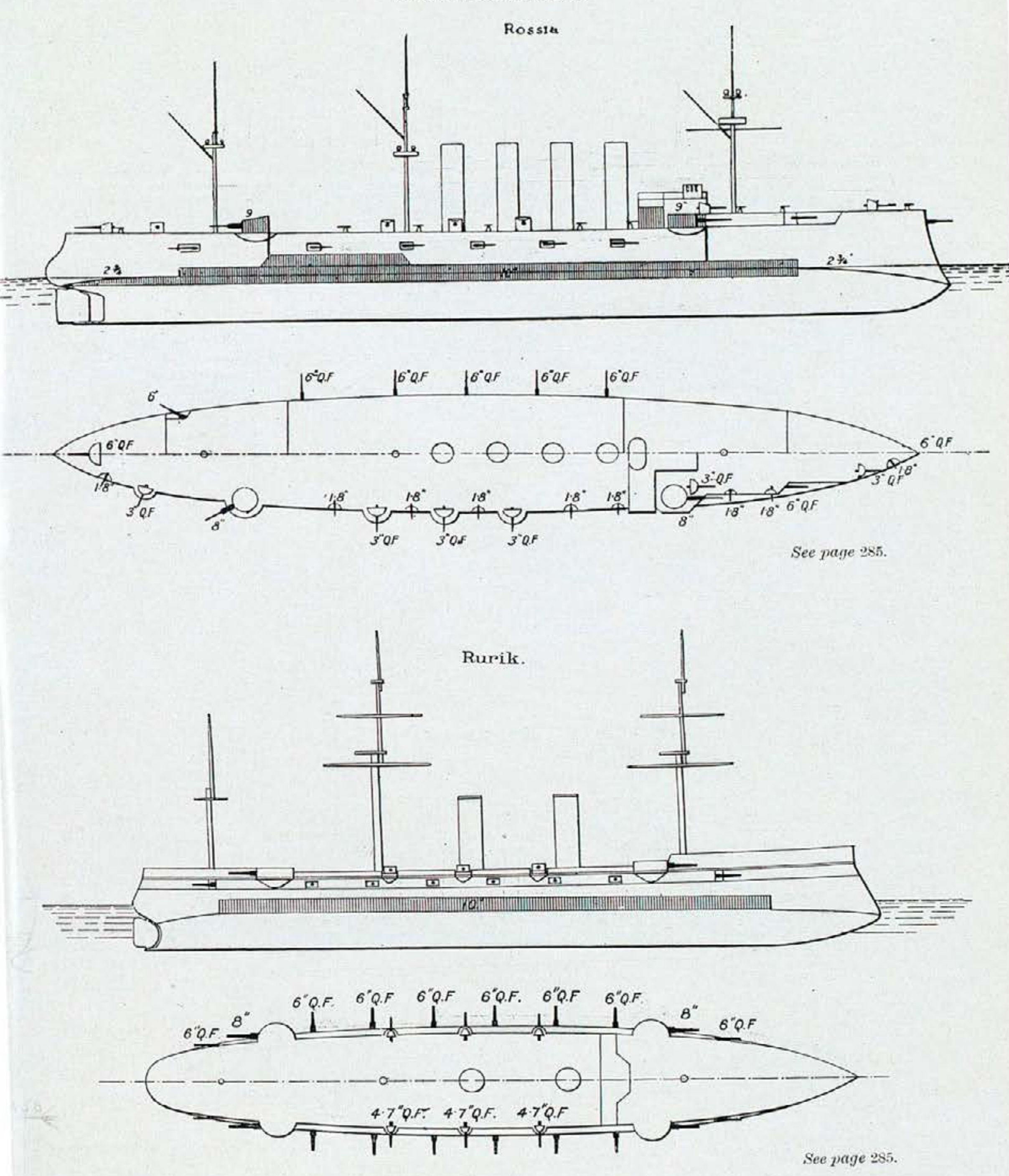
6"Q.F.

6"Q.F.

See page 283.

RUSSIA.

ARMOURED CRUISERS.



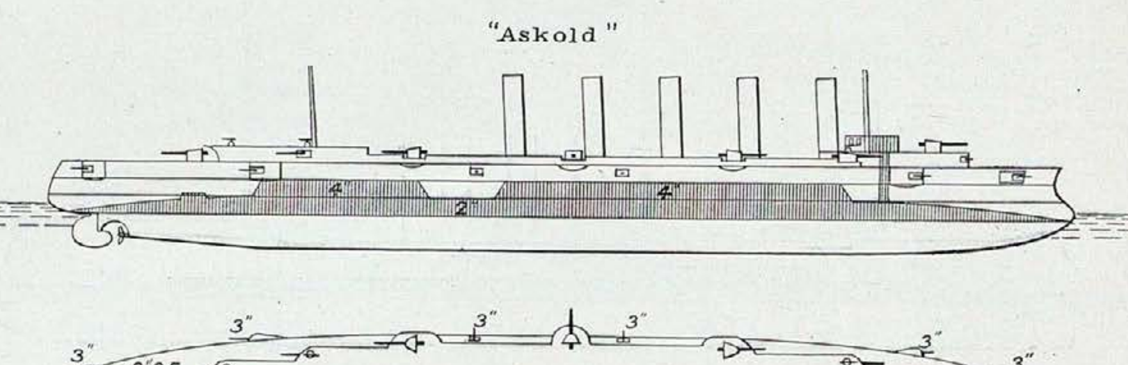
See page 285.

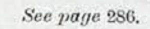
See page 285.

RUSSIA.

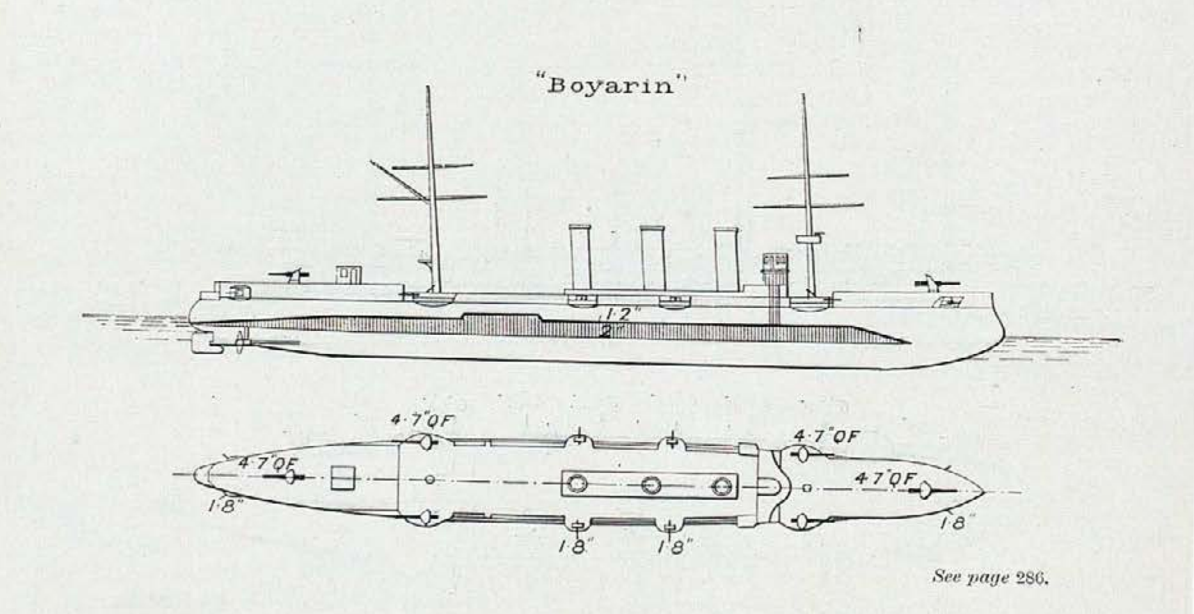
CRUISERS.

"Askold"




See page 286.

"Boyarin"

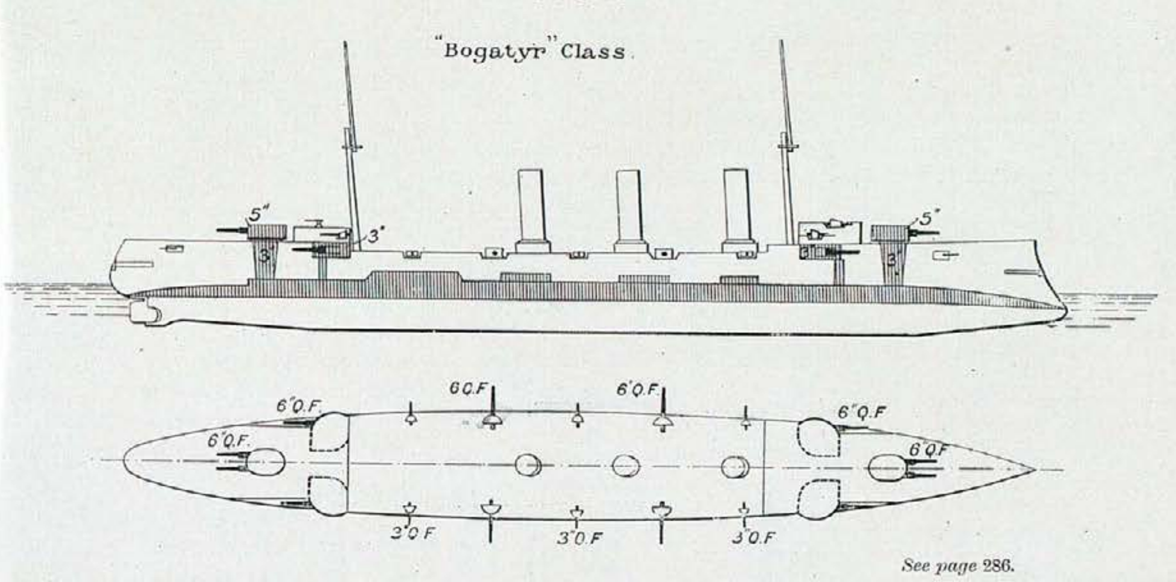


See page 286.

RUSSIA.

CRUISERS.

"Bogatyr" Class.



See page 286.

Pallada

2½"

6"Q.F. 6"Q.F. 6"Q.F.

3"Q.F. 3"Q.F. 3"Q.F. 3"Q.F.

6"Q.F. 6"Q.F.

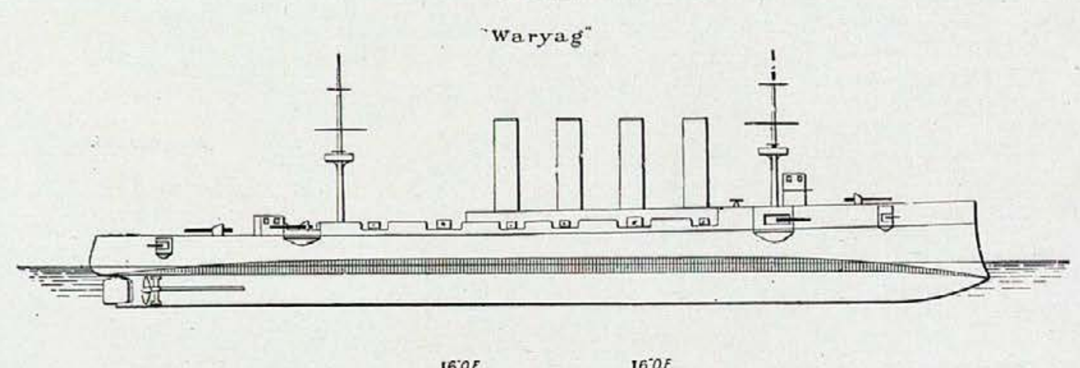
3"Q.F. 3"Q.F. 3"Q.F. 3"Q.F. 3"Q.F. 3"Q.F.

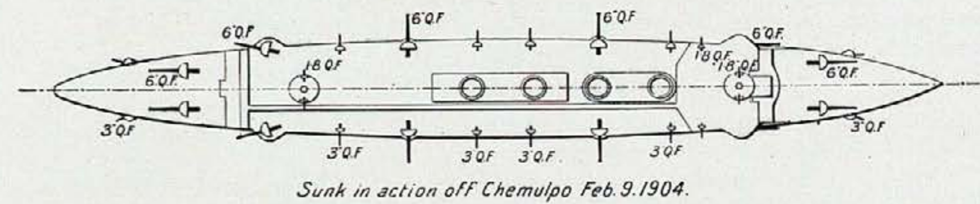
See page 287.

RUSSIA.

CRUISER.

"Waryag"





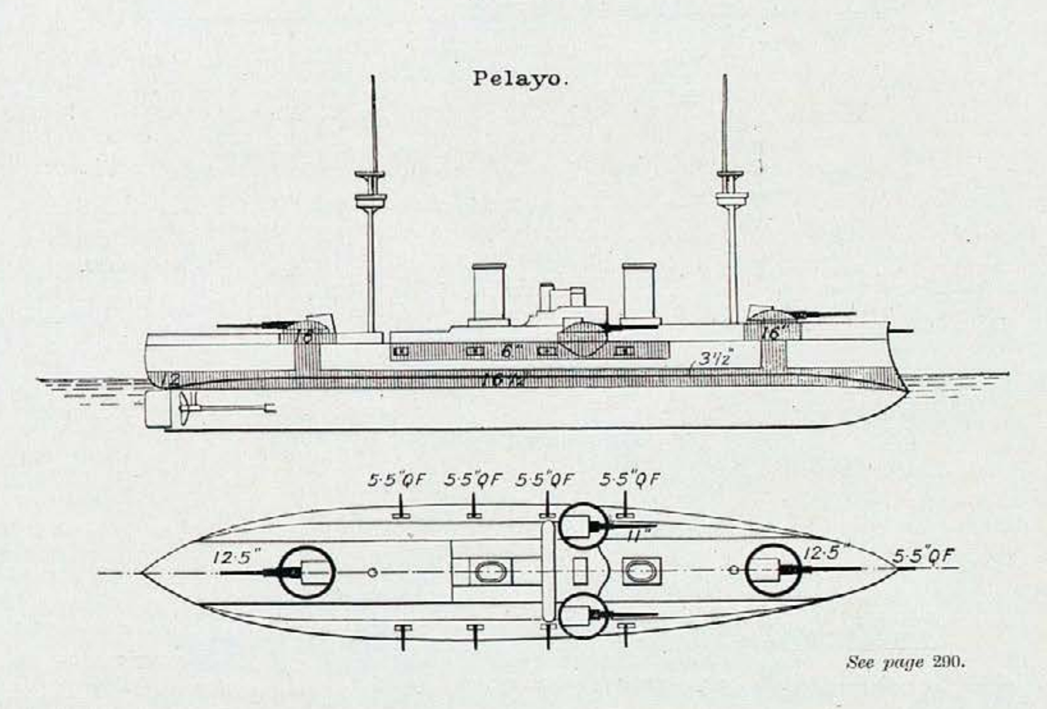
Sunk in action off Chemulpo Feb. 9. 1904.

See page 288.

SPAIN.

BATTLESHIP.

Pelayo.

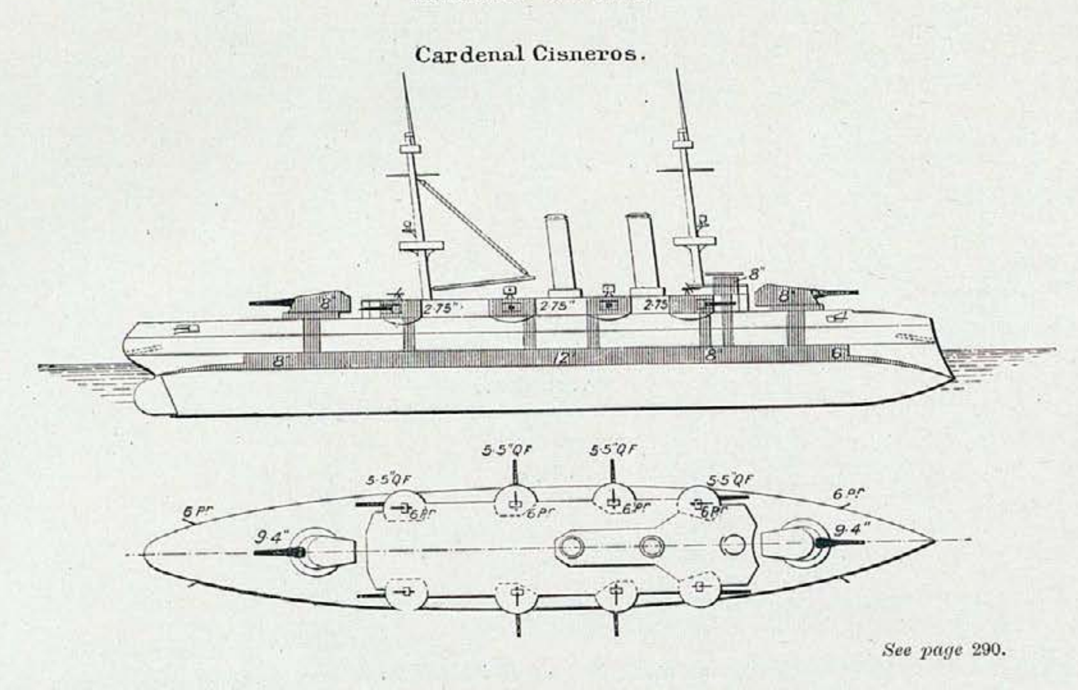


See page 290.

SPAIN.

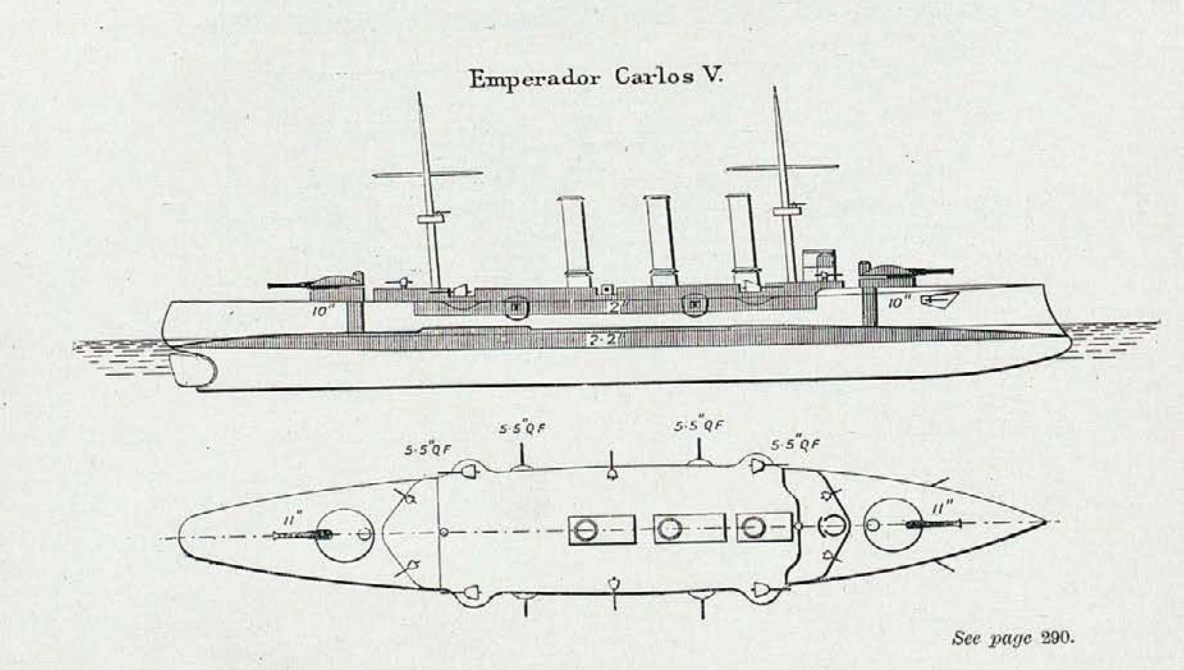
ARMOURED CRUISERS.

Cardenal Cisneros.



See page 290.

Emperador Carlos V.

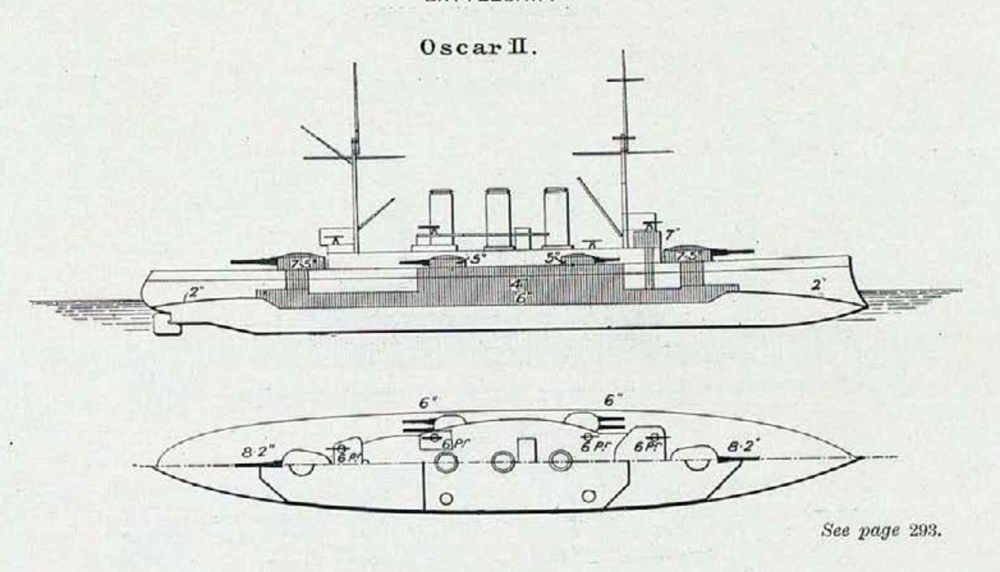


See page 290.

SWEDEN.

BATTLESHIP.

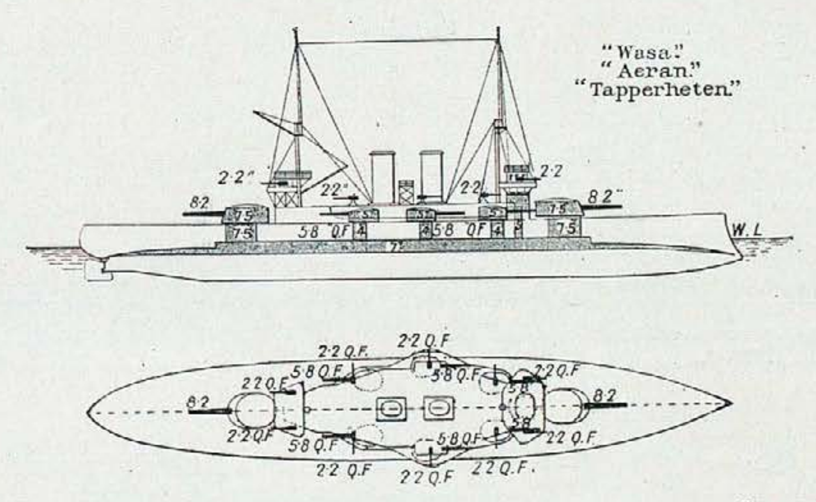
Oscar II.



See page 293.

COAST DEFENCE SHIPS.

"Wasa."
"Aeran."
"Tapperheten."

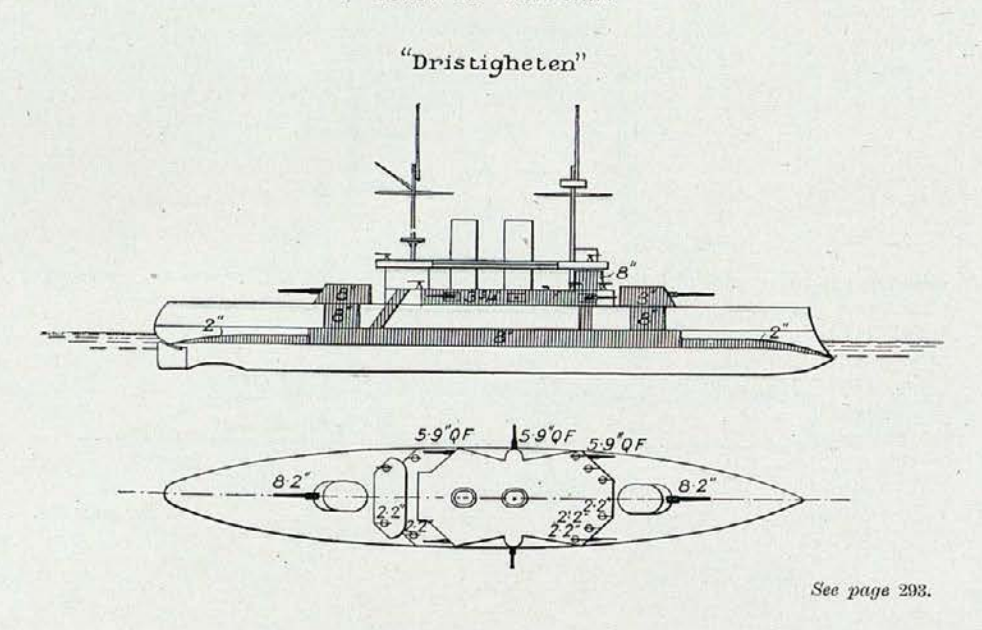


See page 293.

SWEDEN.

COAST DEFENCE SHIP.

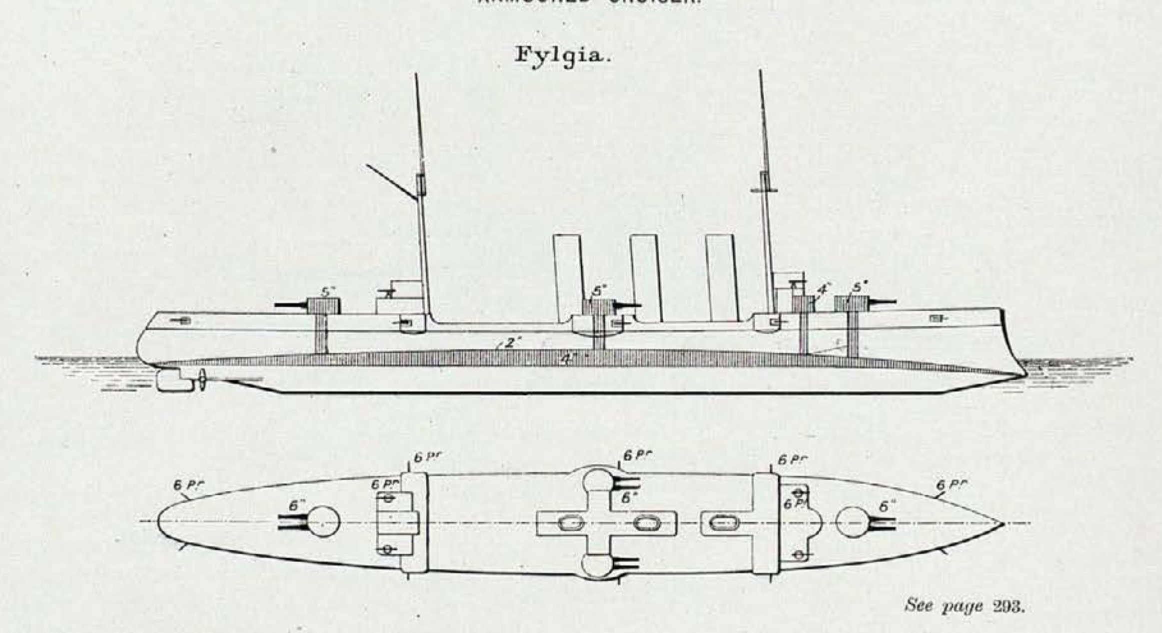
"Dristigheten"



See page 293.

ARMOURED CRUISER.

Fylgia.

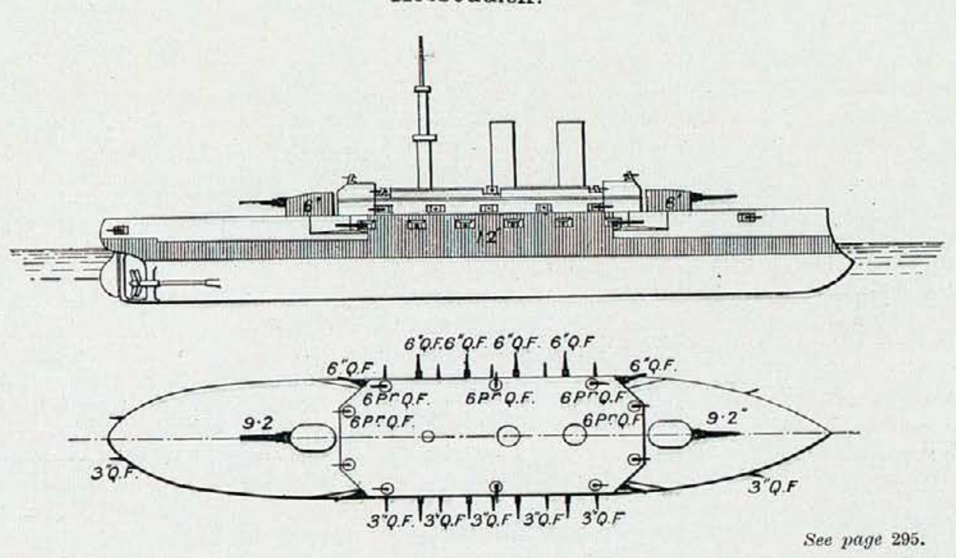


See page 293.

TURKEY.

BATTLESHIP.

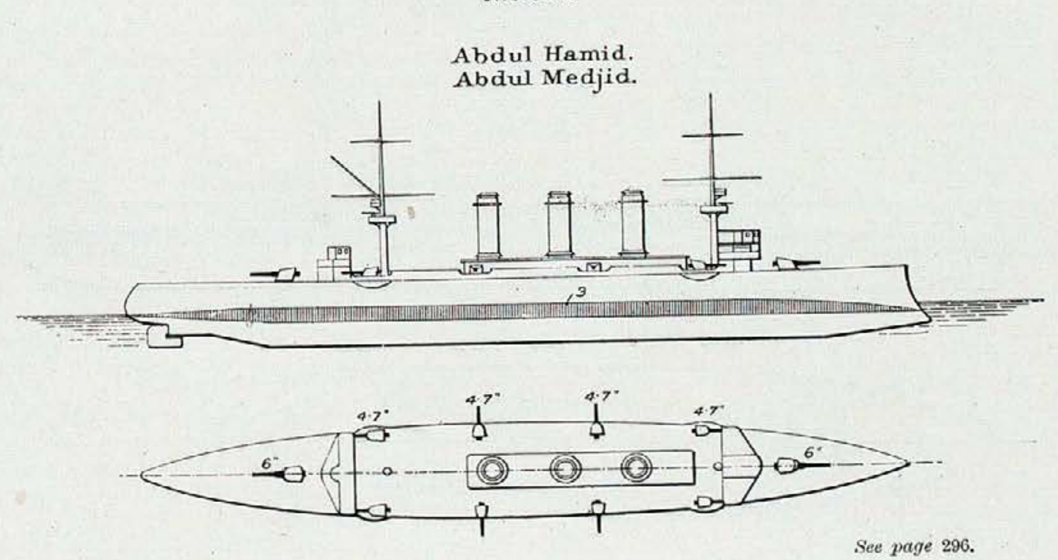
Messoudieh.



See page 295.

CRUISER.

Abdul Hamid.
Abdul Medjid.

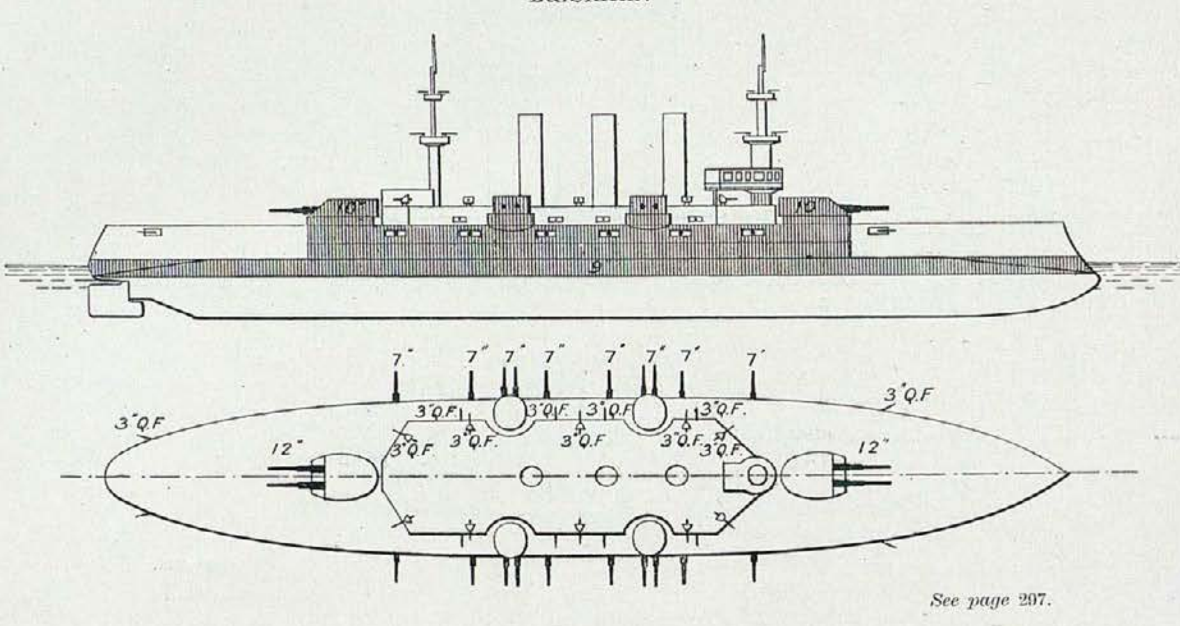


See page 296.

UNITED STATES.

BATTLESHIPS

"Connecticut."
"Luisiana."



See page 297.

Georgia
Nebraska
New Jersey
Rhode Island
Virginia

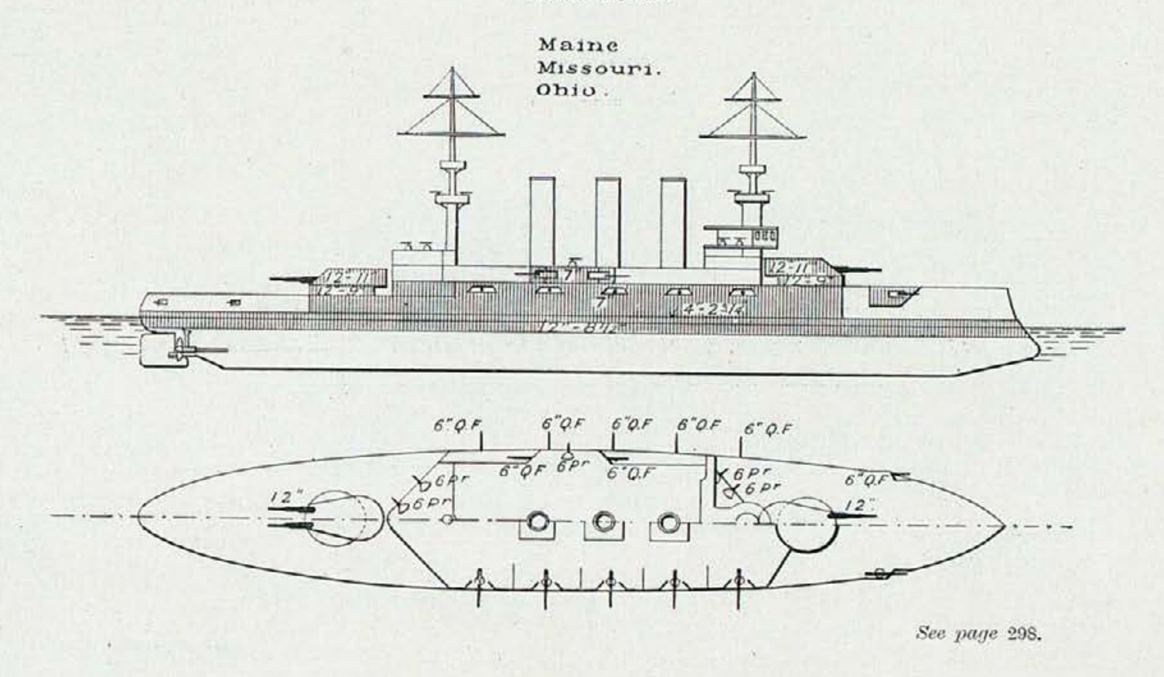
8" B.L
12" B.L
11" at top
8" at bottom
6" Q.F
3" Q.F
3 Pr

See page 297.

UNITED STATES.

BATTLESHIP.

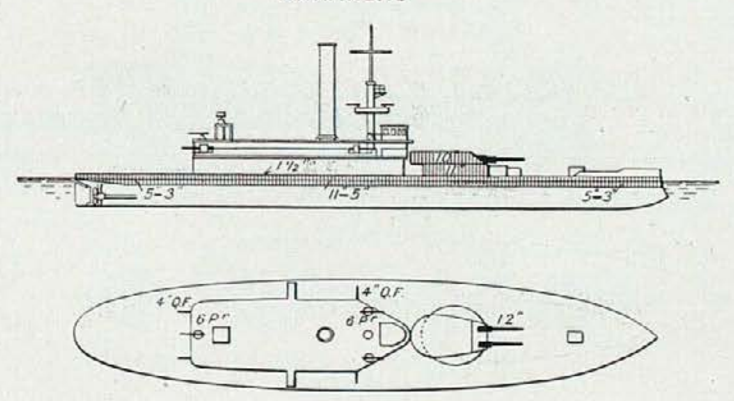
Maine
Missouri.
Ohio.



See page 298.

COAST DEFENCE SHIP.

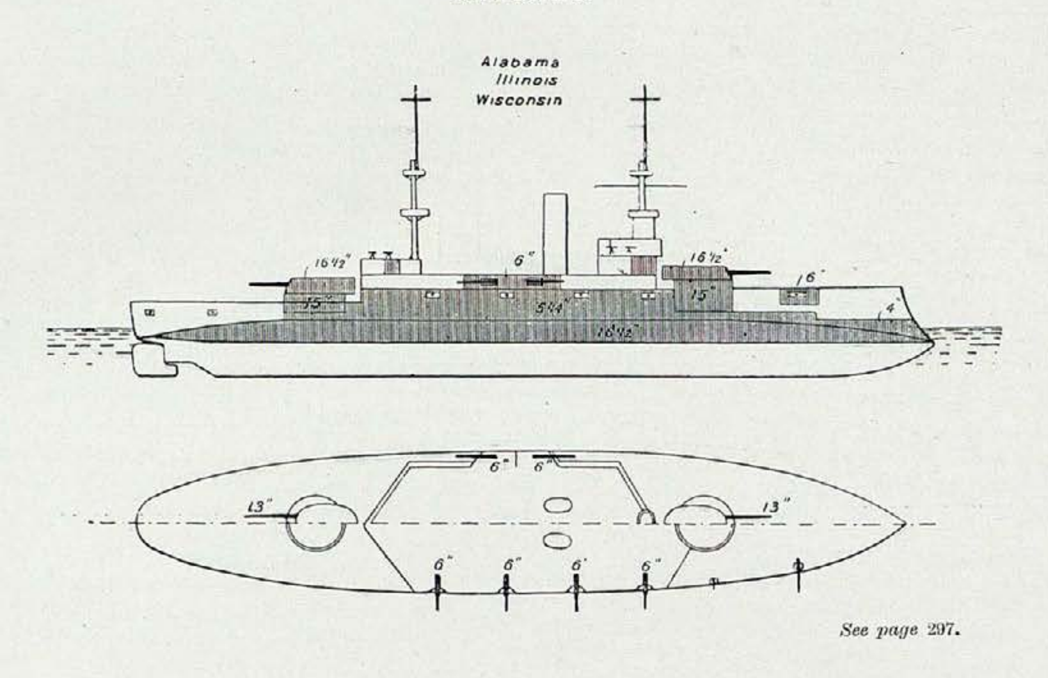
ARKANSAS



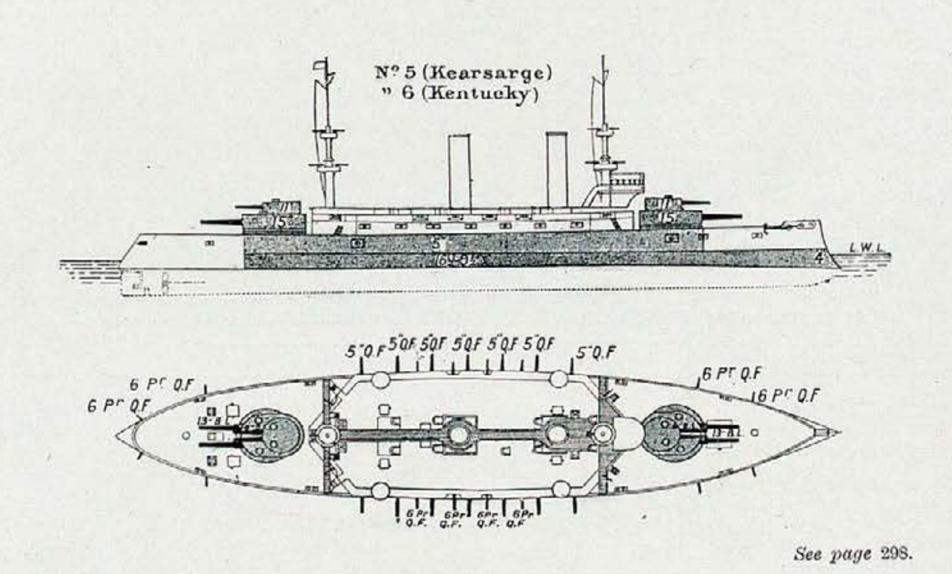
See page 297.

UNITED STATES.

BATTLESHIPS.



See page 297.

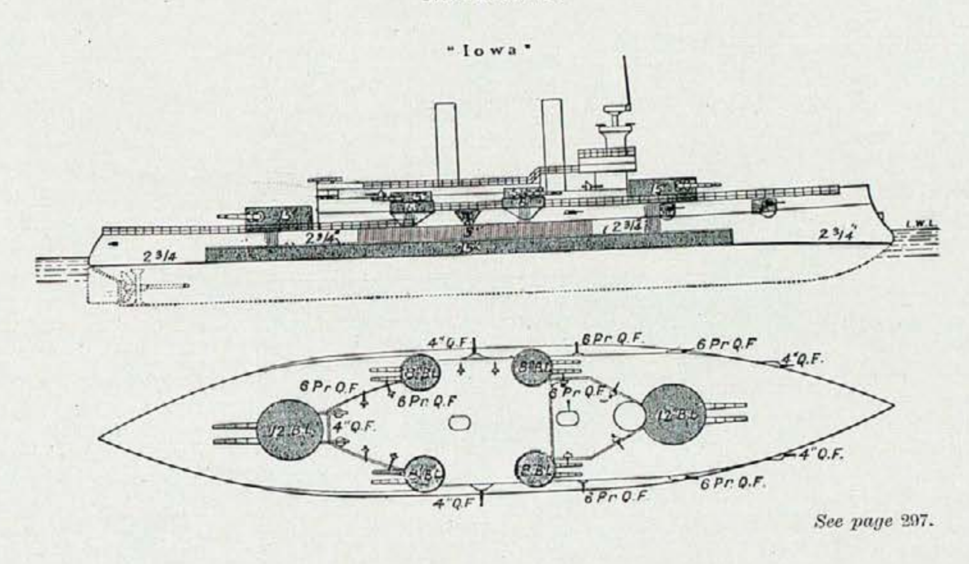


See page 298.

UNITED STATES.

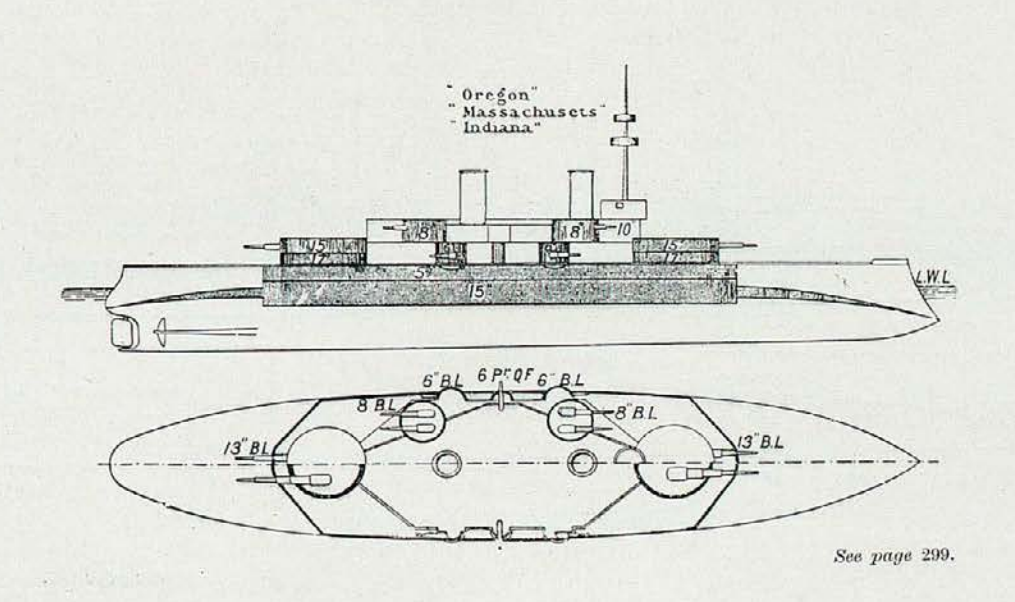
BATTLESHIPS.

"Iowa"



See page 297.

"Oregon"
"Massachusets"
"Indiana"

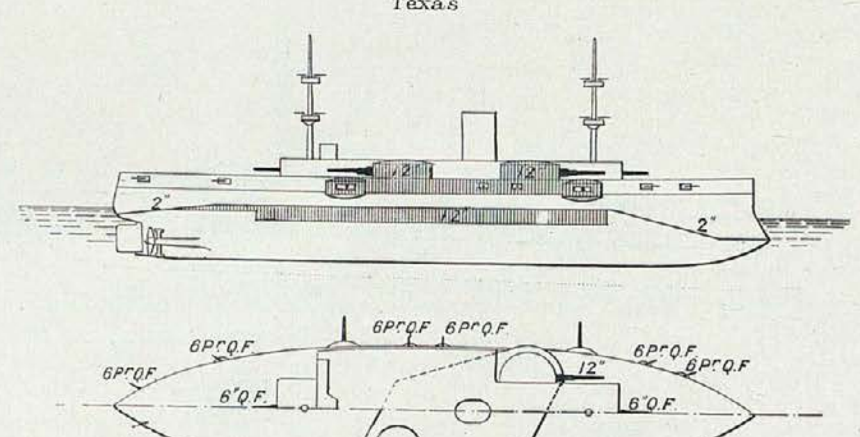


See page 299.

UNITED STATES.

BATTLESHIP.

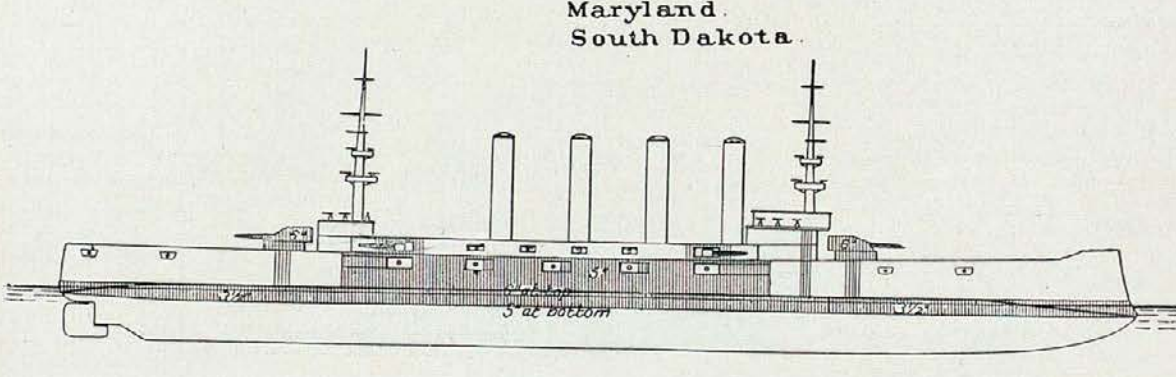
Texas

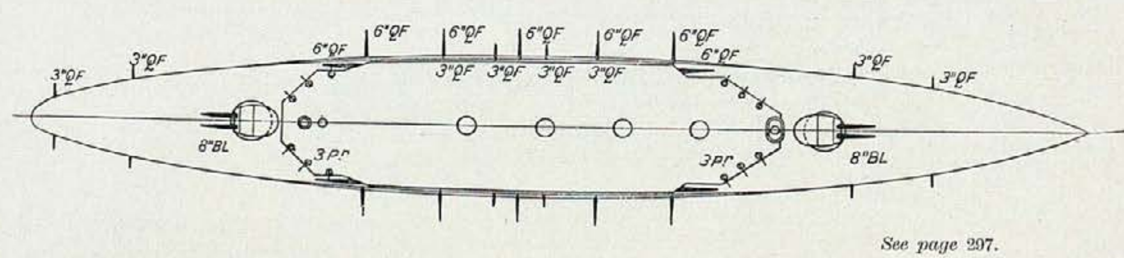


See page 299.

ARMOURED CRUISERS.

California.
Pennsylvania.
West Virginia
Colorado.
Maryland
South Dakota.



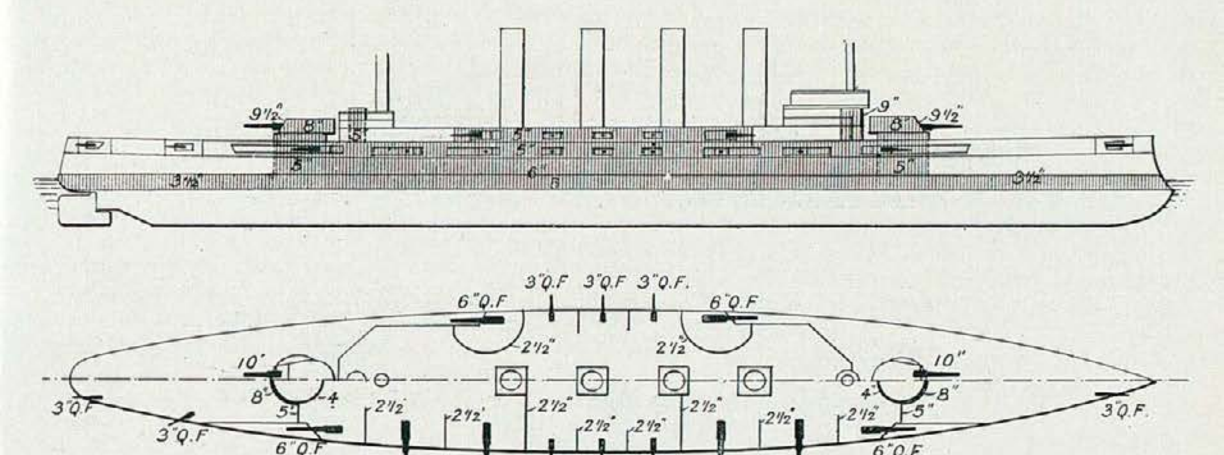


See page 297.

UNITED STATES.

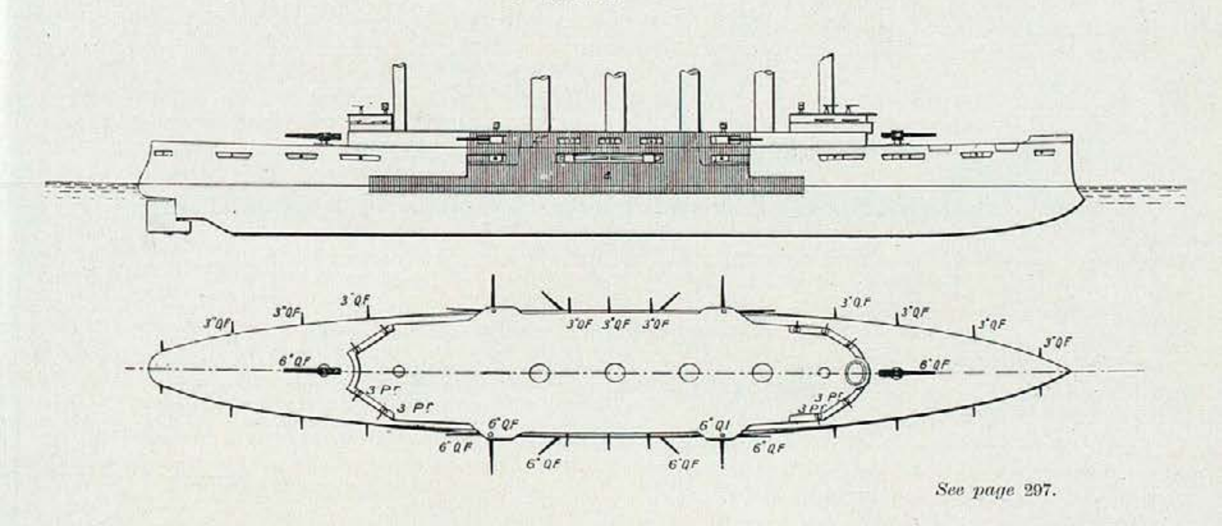
ARMOURED CRUISERS.

Washington.
Tenessee.



See page 299.

Charleston.
Milwaukee.
St Louis.

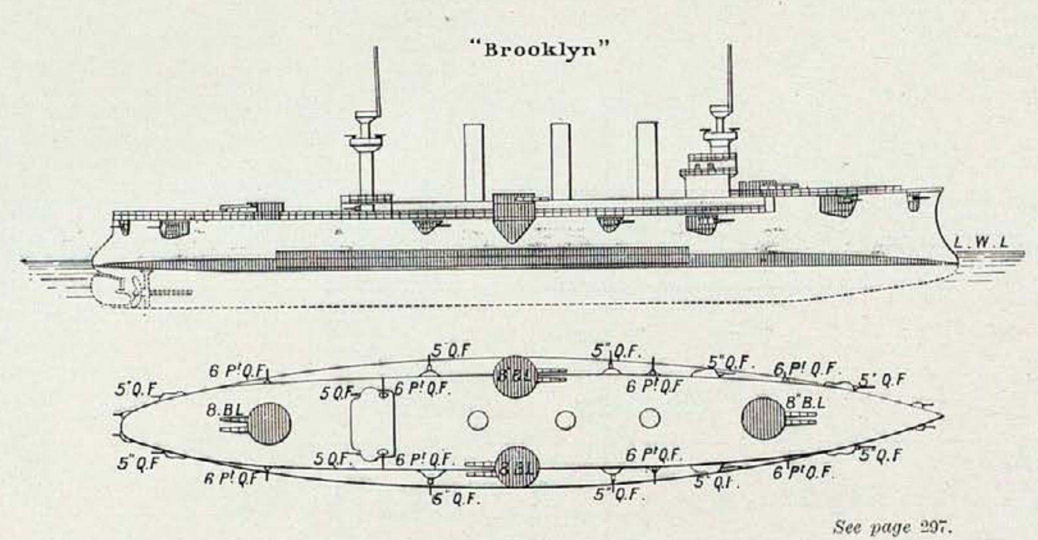


See page 297.

UNITED STATES.

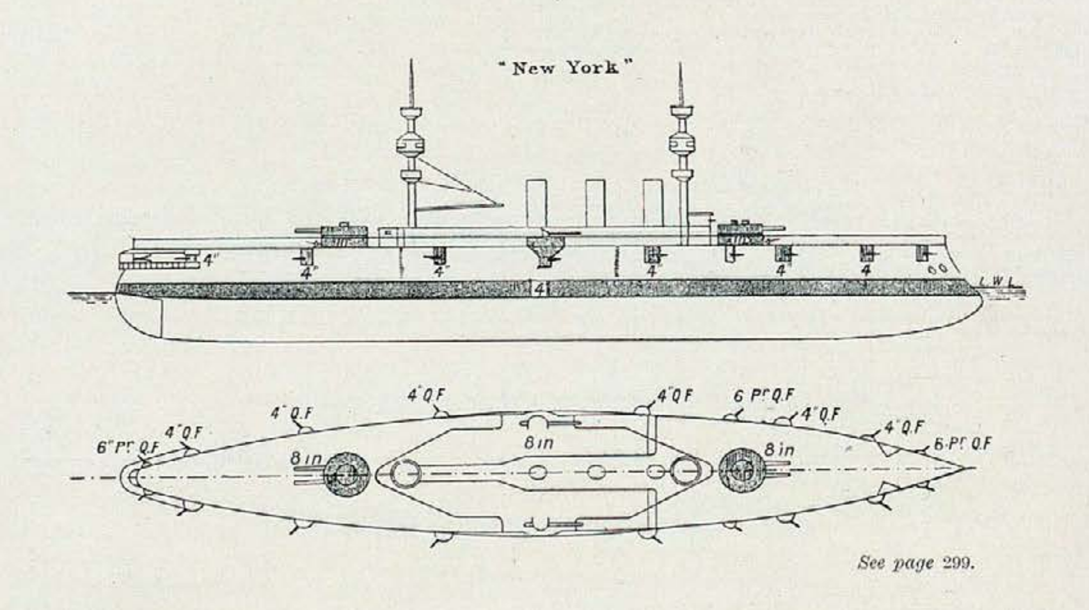
ARMOURED CRUISERS.

"Brooklyn"



See page 297.

"New York"

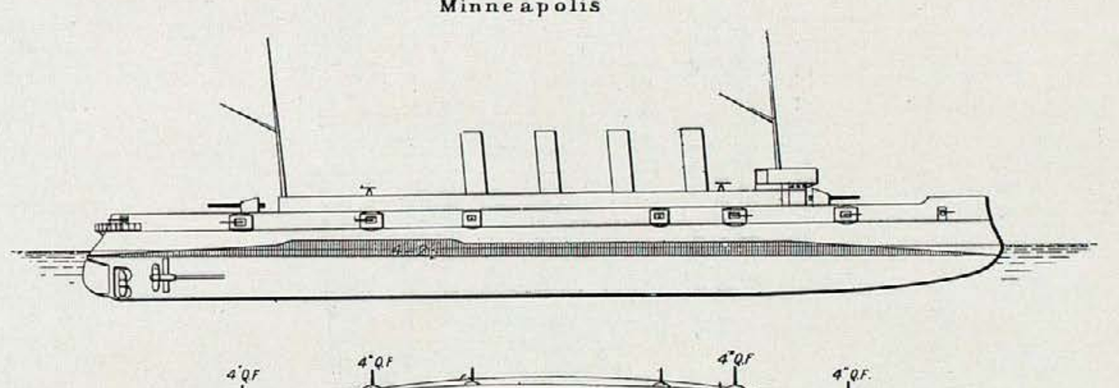


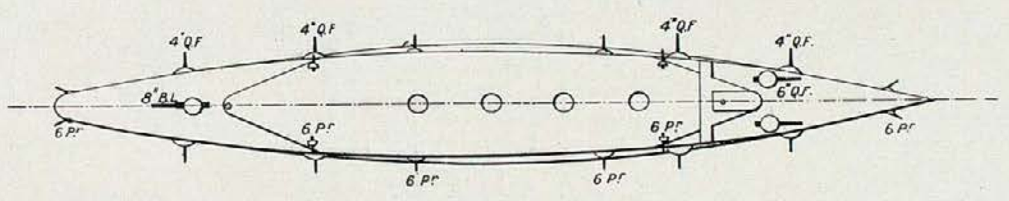
See page 299.

UNITED STATES.

CRUISERS.

Columbia.
Minneapolis





Note - *Minneapolis has only two funnels.*

See page 300.

UNITED STATES.

SUBMARINE TORPEDO BOAT.

Adder. Moccasin. Porpoise.
Grampus. Pike. Shark.

On Special Scale.

Compass & Binnacle
Air Vents
Main Ballast Tank
Compensation Tank for Torpedo
Auxiliary Motor
Bilge Pump
2000 lbs Air Flask
2000 lb. Air Flask
50 lb Air Flask
1016 Air Flask
Expulsion Tube
2000 lbs Air Flask
Bulge Pump
Thrust Bearing
Clutches
Clutch
Gas Engine
Dynamo Motor
Trimming Tank
Water tight Compartment
Storage Battery
Auxiliary ballast Tank
Circular Compensating Tank
Storage Battery
Main Ballast Tank
Main Ballast Tank
Gasoline Tank
Trimming Tank
Torpedo compensating tank

See page 321.

PART III.

ARMOUR AND ORDNANCE.

PART III.

CHAPTER I.

Submarines and Torpedo Warfare.

In the *Naval Annual* of 1902 Commander Robinson gave a succinct review of the progress and development of submarine vessels up to that year, dealing especially with such structural details as were known of the craft—then complete or building. In the present article the intention is to deal somewhat more broadly with submarine attack, not only the attack of submerged or nearly submerged small craft on larger ships, but also with torpedo warfare generally. That torpedo warfare has been and will be greatly influenced by the development of the submarine there is no doubt. But apart from the submarine, the introduction of the gyroscope has made a very great difference in the importance of under-water attack. It is usual to trace back the ancestry of the submarine to Bushnell's craft, invented towards the close of the 18th century; but Bushnell's vessel was a combination of the submarine and the mine, and this arrangement has never been and can never be of any great fighting value. It is the combination of the submarine and the torpedo that is so valuable; but for the Whitehead the submarine would remain as an interesting toy, and but little more.

Development of vessels for torpedo warfare.

The first vessel in which the Whitehead was used from a submerged tube was the British Vesuvius, which dates back to 1874. Like the present day submersibles, she aimed at getting within torpedo range of a big ship without being noticed. For this purpose she was very low in the water, and presented a very small target.

A clear view essential.

But small as the target was it was large enough to be clearly visible at quite a long range, and a very few hits on the above water portion would suffice to sink her. The advent of the quick-firing gun rendered the Vesuvius (with her slow speed of 10 knots) quite unserviceable, and her place was taken by high-speed, light-draft torpedo craft, with not only the torpedo tubes but also the engines and boilers well above water. These vessels used their high speed

both for getting within range quickly and for escaping after firing. And when it was endeavoured to build a type of vessel with high speed, but showing very little above the surface, and fitted with submerged torpedo tubes, the great cost of the first ship, the Polyphemus, prevented any similar craft being built. In order to get a number of invulnerable torpedo vessels for a moderate sum, it was considered desirable in the submarine or submersible to return to the small size and cost of the Vesuvius, with the same low speed, and to provide means for taking cover under water when attacked by the quick-firing gun. Thus it is the desire to evade the gun that has caused the evolution of the modern submersible, which escapes under water when hard pressed. It must be clearly understood that the submersible (a much more explicit designation than submarine) is steered to the best position for attack in precisely the same manner as the low freeboard Vesuvius or Polyphemus. The officer who commands a submersible on seeing his opponent steers to intercept her, and he cannot choose the right course to do so unless he has a clear view. A vague impression still prevails in some quarters that some instrument may be invented, or has actually been devised, by which the captain of a submersible may be enabled to keep his craft entirely under water, and yet adjust his course so as to intercept a moving enemy. This is quite impossible, as even 100 feet of water is quite as efficient an obstacle to vision as a brick wall. The first necessity for a submersible is that the officer in command should have a clear view of the enemy up to the time when he fires his torpedo. The torpedo once fired he can dive to escape, but when fairly under water the submersible is practically harmless.

It is necessary to see and not be seen.

The problem of how to obtain a good view without being seen by the ship that it is desired to attack is the all-important one, and much of the success or otherwise of the submersible must depend on the arrangements made to enable her captain to see and not be seen. The simplest plan, and one that should be very efficacious when the weather is misty or there is a certain amount of sea on, is to have the top of the conning-tower above water whilst the hull is still immersed. This appears to be fully apreciated in France, and both the early submarines Gymnote and Zédé, together with the up-to-date submersible Triton have conning-towers rising some 5 feet above the hull of the boat. The Lake type of boat in the United States also has a high conning-tower, but the original Hollands have very low ones. This is, however, altered in the modified Holland boat A 1, recently run down when exercising at Portsmouth, for the conning-tower is about the same height as in the French craft. If the sea is very smooth a circular conning-tower makes a good deal of splash

in going through the water, and it is therefore desirable to make it boat-shaped, as has been done in the Lake boat, and also in the French Triton and the latest Hollands. If the top of the conning-tower shows too much, then the boat must be sunk till only the top of the periscope or optical tube remains above water. With the help of this instrument, objects can still be clearly seen, but the arc of vision is necessarily limited, so that it is very difficult to judge the course of a ship which it is intended to attack, and it is almost impossible to guess her distance. As the submersible is very slow, it is above all things necessary that some idea of the range of the enemy shall be obtained, otherwise there is a great liability to get left astern—a hopeless position for attack. Whether the approach to the point of attack is made with the top of the conning-tower above the surface, or with the periscope only showing, it is evidently absolutely essential that the boat shall keep at an even depth. This is the more necessary because the more evenly the boat goes along, the less tendency there is to splash, and thus give away the boat's position. Moreover, if the conning-tower bobs in and out of the water the view is spoilt, and this equally applies to the periscope. In the earlier pattern of boat a good deal was said about the difficulty of maintaining a uniform depth, but both in England, France and America this difficulty has been quite overcome. For example, the Lake boat was kept within 1 ft. of the depth ordered for a considerable time with a stranger at the helm who had never before steered a submersible. The Hollands have an equally good record, and, whatever the exact type of rudder or water-plane, it may be taken as certain that the problem of keeping a submarine at a uniform depth when running submerged has been practically solved.

Submarines and submersibles.

The early French boats were all submarines pure and simple, driven by electric motor only. They proved serviceable but very slow, their radius of action is limited to 50 miles or thereabouts, after which the accumulators needed recharging. After some years of experiments the French have now decided to fit special engines for surface-running to all their boats, and it is this class of boat that they designate a submersible. The first engines used by the French submersibles for surface-running were ordinary steam-engines with boilers heated by liquid fuel, but there were grave difficulties in submerging quickly owing to the necessity of closing up the extensive ventilation arrangements. The heat was also very objectionable. They have now come into line with England and America in using gasolene motors for running on the surface and recharging the accumulators. All boats fitted for running under water, whether submarines or submersibles, use an electric motor actuated by accu-

mulators when submerged. It is the invention of the accumulator that has rendered under-water navigation a practical matter. A motor actuated by an accumulator consumes no air, and there are no deleterious gases to be got rid of. The steam boilers and reservoirs used in the Nordenfelt boat and the early French submersibles made it so hot when under water as to be well-nigh unbearable. Compressed air is out of the question, as taking up too much space. All other motors consume large quantities of air, which cannot, of course, be procured when submerged. The great defect of the accumulator system is its enormous weight. Not more than 2 to 2½ I.H.P. can be obtained per ton of batteries and motor. A surface torpedo craft in which the total weight of engines, boilers, coal and water is the same as that of a submarine of 100 I.H.P. would develop some 3000 I.H.P., but such a craft burns a boatful of air in a few seconds, and this enormous supply of air is essential to all ordinary motors. Thus a very weighty installation is required to propel a boat 8 knots under water, and if an under-water speed of 10 knots was asked for, the displacement would have to be increased to 400 or 500 tons in order to admit of some 300 tons being devoted to the plant for electric propulsion.

The speed of submarines.

When a boat is on the surface, a comparatively light air consuming motor will produce much more horse-power than the heavy electric plant, and can be used for recharging the accumulators. As to the type of motor for use on the surface, the French have tried both steam and petrol engines, the steam boiler being heated by liquid fuel. In England and America the petrol or gasolene engine is exclusively used, the power being generally about some three times that of the electric motor, and the resulting speed about 3 to 4 knots greater. Thus the smaller submersibles have speeds of about 6 knots submerged, 9 knots on surface, and the largest and latest about 8 and 12 knots respectively. Speeds of 15 knots on the surface are talked of, but the boat would have to be very large and very expensive, whilst, as pointed out above, 10 knots is a most unlikely speed under water. The cost of submersible boats running 12 knots on the surface and 8 knots submerged will probably be about £40,000. Thus the idea of a swarm of very cheap vessels stationed at every port or important strategic point does not seem likely to be realised. It is with a view to getting large numbers that the French are building a class of boat of only 70 tons displacement, costing some £18,000. They are confessedly for harbour defence only, their speed and radius of action is very small, and they are generally stigmatised as being unsatisfactory. The following table shows the number of submarines and submersibles built and building in Great Britain, France and the United States.

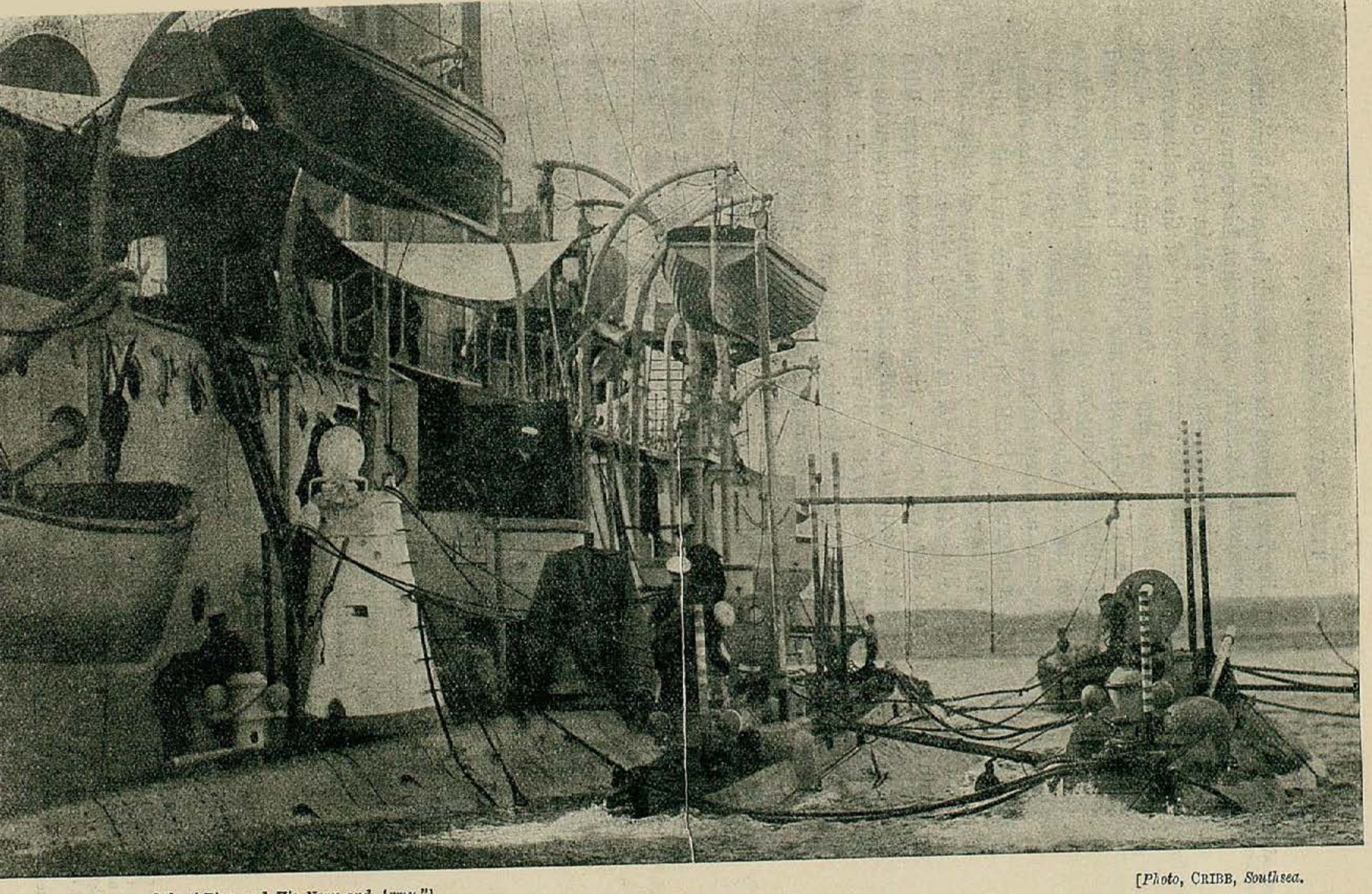
Type.	Names or Numbers.	Displacement.	Length.	Speed. Surface.	Speed. Submerged.	Approximate Radius of Action.	No. of Torpedo Tubes.	Motive Power.	Date Completed.	Total Number.
		Tons.	Feet.	Knots.	Knots.	Knots.				
				GREAT BRITAIN.						
Holland	No. 1	75	63	7	6	200	1	Gasolene and electricity	1901	1
Holland improved	Nos. 2, 3, 4, 5	150	100	10	8	300	1	ditto	1902	4
Holland A type	Nos 1, 2, 3, 4	200?	120?	11	8	400	1	ditto	1903–04	4
										9 built
				Building.						
Holland modified	9 in all	250?	..	12	8	500	2	ditto	1904–05	10 building
Experimental	1	350?	..	14	8	600	(?)	ditto	..	
Holland experimental?	11	..	..	..	..	..	..	ditto	to be laid down 1904–05	11 to be built
				FRANCE.						
Gymnote	Gymnote	30	60	6	5	30	1	Electricity	1888	1
G. Zédé	G. Zédé	270	159	8	7	50	1	ditto	1893	1
Morse	Morse, Francais, Algérien	144	120	12	6	50	1	ditto	1899–1901	3
Improved Morse	Farfadet, Gnome, Lutin, Korrigan	180	135	12·5	9	60	4	ditto	1902–03	4
Narval	Narval, Sirène, Silure, Triton, Espadon	110 to 200	111	12	7	400	4	Steam and electricity	1899–1901	5
Naïade	Naïade, Perle, Protée, Esturgeon, Bonite, Thon, Lynx, Souffleur, Dorade, Loutre, Ludion, Castor	67	77	8	6	200	4	Gasolene and electricity	1903–04	12
										26 built
				Building.						
Naïade	Grondin, Anguille, Phoque, Otarie, Meduse, Oursin, Alose, Truite	67	77	8	6	200	4	ditto	1904–05	8
Aigrette	Aigrette, Cigogne	170	117	10	8	400	4	ditto	1905	2
X	X	165	120	11	8	400	4	ditto	1904	1
Y	Y	213	140	11	8	400	4	Heavy oil only?	1904	1
Z	Z	199	135	11	8	500	4	Gasolene and electricity	1904	1
Ω	Ω	296	160	11	8	600	4	ditto	1905	1
Large submersibles	..	300 to 400	..	..	..	..	..	..	1905–06	6
										20 building
				UNITED STATES.						
Holland	Holland	75	63	7	6	200	1	Gasolene and electricity	1900	1
"	Plunger, Adder, Mocassin, Grampus, Porpoise, Shark, Pike	120	63	8½	7	300	1	ditto	1903–04	7
										8 built

Though France holds the lead with regard to numbers of underwater craft, she has after all only 5 efficient submersibles, namely, those of the Narval class, and they have steam propulsion, which is not altogether satisfactory, and may be changed for petrol motors. She has beside 7 submarines of the Morse class, but their radius is small, and 12 of the 77 ft. Naïade class universally acknowledged to be unsatisfactory, owing to their small size and small radius. Three more vessels of 117 ft. and over will be ready in 1904, but the other 8 to be finished this year are of the discredited Naïade class. Thus when at the end of the year, England has 12 of the generally satisfactory Hollands completed, and 7 others well advanced, it will only be in local harbour defence boats that the French will be superior. And if the 11 boats to be put in hand this year are quickly built, their completion in 1905–06 should see us well ahead of everyone. The United States have voted £100,000 for more experiments, but are holding their hands at present as to the building other boats. They have, however, 8 of the Holland type which have passed their trials well. Thus, whilst France leads at present, Great Britain is a good second, and is coming up fast, with the United States third.

Of the other Powers, Germany has a boat under trial which is supposed to be of the Holland type and is building two others. Italy has three experimental craft building; they too are said to be gasolene and electric. They will not be ready till the end of the year. Russia had a complete failure in 1902 with small-sized craft something like the Gymnote, and is now experimenting with a Rubinoff boat supposed to be a modified Holland of 175 tons, some 80 ft. long. Six new boats of the Djewestki type have just been ordered, but they are not likely to be finished till next year. It has been stated in the French Assembly that they are copied from French designs, but from which of the many boats tried in France is a moot question.

Working a submersible. Her buoyancy.

An important factor in the working of a submarine or submersible is the amount of buoyancy when running on the surface. The submarine proper has only from 5 to 8 per cent. whilst some of the submersibles, notably the French Narval class, have as much as 25 per cent., and the American Lake rather more. When some 50 tons of water has to be admitted this cannot be done in a moment, and a quarter of an hour seems to be about the time necessary for bringing a buoyant submersible to the awash condition. Every endeavour is being made to shorten this time, and it may be that it will be considerably reduced, but if there is any sea on the proper trimming of the boat is a delicate operation and very difficult to carry out quickly. How long the latest boats take is not known, but it is believed the Hollands are very efficient in this respect.



[*Photo*, CRIBB, *Southsea*.

By favour of the "King and His Navy and Army."]

BRITISH SUBMARINES.

On the left is A 1, the enlarged Holland, with its lofty conning tower. On the right the first Holland boats built in England.

Method of attacking.

The first requisite for success in an attack by a submersible is either that the enemy should be stationary, or that his course should be such that it should take him past the boat within torpedo range. If the speed of the ship be taken at twice that of the submersible, the latter has no chance unless she is fortunate enough to plant herself within 2 points of right-ahead of the ship to be attacked, and even then she must see her a long way off to give time to get into the awash condition before she herself is seen. Suppose A be steaming 15 knots, and a submersible, S, running on the surface sights her at 8 miles distance. S fills up her tanks and sinks to the awash condition, stops her oil engine and starts her electric motor, taking 10 minutes, during which A steams 2½ miles and arrives some 6 miles from her opponent. S now steams 8 knots with conning tower awash to cut off A, whilst the latter, seeing nothing, stands on. If the sea is smooth, S will have had to sink before this, till only the periscope is showing, which will make it more difficult for her to steer the right course. What she has to do is to carry out the old rule for chasing and steer so as to keep A on a steady bearing. Let us suppose that she keeps A 1 point before her beam, and that she is steadily 3 points on A's bow; thus after 3·3 miles run she will still be 3 points on the bow of A and the distance will be narrowed to 1000 yards off. She continues to keep A on a constant bearing till she gets to some 500 yards from A, and here she starboards her helm to bring her torpedoes to bear. She fires while still under starboard helm and immediately dives, going off under water in order to escape. The torpedoes have a run of 300 yards before they would strike A's new position if she continues to hold her course and speed. If A catches sight of S at 1000 yards range the submarine's only chance is to put the helm hard to starboard, reversing the port engine for a minute or so, and then going full speed ahead. The result would be that when S fired his 30-knot torpedoes, capable of running 1200 yards, they might just overhaul A. The chance of hitting would be naturally very small, not one-tenth of that which the submersible would have had if unseen up to the 500 yards range, and with torpedoes set for slower speed and long range the chance would be less still. This example shows the immense importance of remaining unseen, and at the same time how necessary it is for the submersible to see clearly, for if A turns away the direction for firing the torpedoes is quite different from what it is if he stands straight on. The closer S gets the better for her, but she *must* keep on A's bow, for if left astern she has no chance.

Importance of speed and turning power to ship attacked.

It is evident that speed is important for a ship passing through waters likely to be infested with submersibles, and that the power of

turning rapidly is also most important. There is also a distinct and definite danger area extending about 3 points on either bow of a ship. A couple of destroyers from 1½ to 2½ points on each bow, and say 6 cables off, might see the periscope and give warning in time to allow the ship to turn away. As to whether a destroyer could be fitted with any weapon competent for dealing with submarines, it does not seem that there is much or any hope of doing anything with an outrigger, the submarine would dive far too quickly to be thus caught. Of various proposals that have been made, one of the most promising* is to use torpedoes in a destroyer, not the cumbrous, slow-firing Whitehead which is used against ships, but something smaller, handier and lighter, of which several could be fired in a minute. The submersible presents an under-water target 120 ft. long and 10 ft. deep which ought not to be very difficult to hit at, say, 200 yards range, and only a small explosive charge is required if the torpedo is exploded on impact. The project of firing a big torpedo with a time fuse is most unpractical, not to say absurd. On the other hand, submarine warfare will naturally lead to a great development of submarine projectiles, and in all fighting in which projectiles are used the great point is to have the means of firing a great number in a very short time. The speed of the submersible when under water will not be more than 7 or 8 knots, so that a comparatively cheap and light torpedo which would run, say, 16 knots for 300 yards, ought to be competent to overhaul the submersible even if fired from astern. The Q.F. torpedo tube would be carried in a destroyer, torpedo boat, or even in a ship's picket boat. Immediately a periscope was sighted, the destroyer would make for it at her highest speed, discharging, say, 3 or 4 torpedoes when she reached 100 yards. If the submersible saw that she was discovered, she would of course dive and might thus escape, but, at any rate, her chance of torpedoing the ship would be gone. It does not seem impossible that by sending light scouts ahead in this way a ship might pass through dangerous waters in safety. Directly the submersible was sighted by the scout, the ship would turn away, and, having gone far enough to clear any torpedoes, say 1 mile, she would turn back, whilst the scouts and destroyers would resume their look-out station as before.

Method of attacking submarines.

In order to enable the destroyers to make a perfectly exhaustive search of the water on the bows of the ship or squadron to be protected, it has been proposed that a length of hawser should be towed between each pair of boats. This is a simple and reasonable plan, but it requires to be combined with the Q.F. torpedo to enable the submersible to be destroyed immediately detected. Thus, if the

* See *Naval and Military Record*, Feb. 25th. Letter from Mr. Carr Laughton.

hawser catches a periscope or conning-tower, the Q.F. torpedo tube, being kept trained in the direction of the hawser, will be at once fired. Care must, of course, be taken not to hit the other towing destroyer; but, speaking generally, the Q.F. torpedo will be set to such a depth as to pass under a destroyer.

Armament of submersibles.

The submersibles themselves must evidently be fitted to fire the largest sized torpedoes, indeed all of them are doubtless so fitted now. It is not likely that they will get more than one opportunity of firing, and it is most important that a hit when made should be decisive. A ship with even a large hole can be repaired in a month or two if she can be got into dock, whereas make the hole somewhat more extensive, and she will go straight to the bottom as did the Almirante Cochrane. In the earlier Holland boats, and it is believed in the French ones also, spare torpedoes were carried other than the one in the tube. The tubes have now been increased in number, and there are no spare torpedoes. The tubes in a submersible must be fore and aft; the natural place for them is in the bows, so that the boat when attacking is steered so as to align the tubes in the right direction. Thus the handiness of the boats is important. Unfortunately it is not easy to attain handiness when submerged, and the turning circle of all vessels running under water is large, so it is therefore the more necessary to sight the ship attacked at a great distance off, and during the approach to keep the course accurate. The idea that the boat may altogether go out of sight under water, come to the surface, alter course as required and go down again in a few seconds is not a practical one, and assumes that the enemy steers a steady course, a very foolish thing to do when submarines are about. The speed and course of the enemy can only be determined by keeping her in sight for some time, a transitory glimpse for a few seconds is not sufficient. Moreover, the splash made on coming up may betray the boat, and allow the ship to turn away in time. If a boat has her stem in entirely the wrong direction, there is some advantage in being able to fire torpedoes aft as well as ahead. The French boats, or the larger ones at any rate, carry four tubes, two pointing ahead and two astern. A boat armed thus would certainly have an advantage over a double-tubed boat if she got close up to a fleet without being seen. If submarines take to carrying small torpedoes for defending themselves against destroyers, they would naturally point aft. Small torpedo tubes would not interfere with propelling and steering gear to the same extent as large ones. Although the tubes in a submersible must be fore and aft, the torpedoes can be directed by the gyroscope to any desired angle with the keel, as is done in the United States Navy, where ordinary torpedo boats

fire torpedoes from a tube abeam with a gyroscope adjusted to cause the torpedo to settle on a course parallel to that of the boat. The converse arrangement could be applied to a submersible's torpedo which could be adjusted so that after leaving the right ahead or right astern tube they would take up a course 4 points or more from the keel-line as desired. In this way a boat with 4 tubes, two ahead and two astern, could arrange to concentrate her fire, and could discharge 4 torpedoes almost simultaneously at the same target. This would be useful if it was impossible to get very near to the enemy without being seen. But the extra mechanism for making the torpedo alter course after it has left the tube is liable to cause a certain percentage of lost shots, and, in this country at any rate, the device is not looked upon with favour.

Sea-going qualities.

With regard to the sea-going qualities of submersibles, trips of 200 to 300 miles have been made by British, French and American boats in all kinds of weather. The British boats were reported to have behaved well in bad weather off the Lizard, and the French boats have manœuvred off Cherbourg, Brest and L'Orient in a considerable sea. The boats seem to behave best when running on the surface, that is with a buoyancy of some 30 tons or more. In most cases, unless the sea is very rough or the height of the conning tower insufficient, the latter is kept open. Otherwise the air supply depends on ventilators above the wash of the sea. There must always be a good deal of discomfort from rolling. The circular section of the boat offers little or no resistance to rolling motion. It is not known if bilge keels have been tried, but they ought to be as useful in checking the rolling as they have been with destroyers. The vertical sides of the upper part of the hull in the French Triton class must also tend to greater steadiness in a seaway. In this respect the development of the submersible is in the direction of a form of body very similar to the Polyphemus. Up to the present the accommodation for the crew in the submersible has been very limited. The Lake boat, however, provides fairly good sleeping quarters, as well as cooking and sanitary arrangements, for her crew of eight men, and there seems no reason that the men should not fare as well as they do in a surface torpedo craft. This, of course, applies to the light or surface running condition only. But it is on the surface that the boats will do all the running; their radius of action being at present governed by the amount of oil carried for the gasolene engines. It is quite likely that 600 miles may be attained. Moreover the boats can always be towed, the French have towed the submarine Gustave Zédé considerable distances, and the Gnome and

Lutin were towed most of the way from Lorient to Bizerta. In the United States the boats have not only been used by day but at night; thus, in a torpedo attack on a defended harbour, a Holland boat running on the surface got in unseen, whereas the ordinary torpedo boats were discovered and ruled out of action.

General summary.

Summing up, there is no doubt that the submersible has a useful future before it. The problem of maintaining a regular depth has been completely solved, and both the surface and submerged motors are serviceable and satisfactory, though doubtless improvements will be made. Their speed must continue very low, especially when submerged, and the radius of action must be somewhat limited; but, still, in the narrow waters of the Channel, North Sea and Mediterranean they will exert a considerable influence. And generally any waters in which a number of submersibles are stationed will be well-nigh untenable for hostile ships, though by taking special precautions they may pass through unharmed. As yet no satisfactory means of attacking these craft has been developed, but it does not appear likely that they will long retain their present immunity, and it is rather to the torpedo than to the gun that we must look as the weapon to be used. Harbours can be defended against submarine attack by the use of mines, but breakwaters and booms with heavy and strong under-water parts are very much to be preferred. It must be remembered that, even when running on the surface, the submersible has a very deep draught, say 10 to 14 ft., and when submerged she requires at least 30 ft. depth of water. If a boom goes within, say 12 ft. of the bottom, the submersible can only run under it by smashing up her conning tower and periscope, which, if it did not sink her altogether, would render her harmless.* But ships will no longer be able to lie stationary during the day in positions known to the enemy, unless they have taken adequate precautions by the use of nets or a ring of scouts to shelter themselves against attack by submersibles. It remains to be seen whether this will have to be demonstrated in the next war, as a similar truth with reference to surface torpedo craft and anchoring at night in an exposed position, was forcibly demonstrated to the Russians outside Port Arthur. And it behoves those who would not wish to act as warning beacons to the world, not only to prepare in peace time the necessary defences but also to continually exercise all concerned in their use.

* The unfortunate accident to A 1 happened since this was written. It shows that a moderate blow on the conning tower will disable and sink a submersible when submerged. The provision of a boom to keep out all submerged vessels should not be very difficult.

It is at least four years since the gyroscope was so far perfected that it was adopted in both our own and foreign Navies. But for some time the number of torpedoes fitted was not very large, and as always happens when a new invention comes into use, it was some time before the enhanced power of the gyroscopically-guided torpedo was generally appreciated. Before the introduction of the gyroscope the limit of range of the torpedo was placed at 800 yds., for any inaccuracy being cumulative the torpedo turned aside more and more as it progressed, thus it was almost certain to be so deflected in, say, a minute and a half that it would be 4 or 5 points off its proper course before it reached 1200 yds. The air-supply of the 18-in. torpedo, which has now been in use for ten years, was quite sufficient to propel it some 2000 yds. at a moderate speed, but long range not being required this quality remained in abeyance. The Whitehead and the gyroscope.

Now, however, it is fully realised that long range torpedo fire may be of the highest value, not so much that it is expected that it will be easy to hit a single ship at 2000 yds., but because it will be easy enough to make sure of hitting a line of ships at that range. If the ships in line are broadside on, the most natural position for a gun action, the intervals in the line are only twice as great as the spaces occupied by the ships. Thus a torpedo running through a line ahead has a chance of hitting of 1 in 3. If the ships turn till they are in line abreast, a torpedo run at right angles to the line has only a chance of about 1 in 16. But such a shot would be quite exceptional, and if the torpedo is run at a line abreast at an angle of only 1½ points from the direction in which the ships are steering, the chance of hitting is doubled, and amounts to 1 in 8. A line of 12 ships can fire simultaneously from 12 to 24 torpedoes on the broadside. If we take the lowest number, such a line would, with one discharge, be practically certain of disabling one ship of an opposing line, and with average good fortune they might expect to hit 3 or 4. Seeing that such decisive results may be expected by simply firing torpedoes through the enemy's line, it is perfectly obvious that the fleet which has the longest ranging torpedoes has a great advantage. Thus, suppose a fleet possessing torpedoes capable of running 3000 yds. engages an equally powerful fleet whose torpedoes only ran 2000, the latter must either keep outside 3000 yds. or run the risk of being torpedoed without the possibility of reply. Long range torpedo fire at ships in line.

So far as is known, no nation has at present any considerable number of torpedoes capable of running much more than 2000 yds. Moreover the speed of existing torpedoes at this range is low, some Provision of long range torpedoes.

20 knots at the most. Experiments are, however, being pushed on, and we hear that Whitehead at Fiume has constructed experimental 18-in. torpedoes which run 3300 yds., and it is presumed will load in existing tubes without overmuch alteration. The U.S. Admiralty have on order two 21-in. torpedoes to run at 26 knots for 4000 yds., and there are reports as to modifying the existing 18-in. torpedo so as to enable it to run 3000 yds. The modification will take the form of increasing the size of the air chamber, raising the pressure to which it can be charged, and possibly of superheating the air by an alcohol flame whilst on its way to the engines. This latter device has given good results in the United States, and seems likely to be generally adopted.

Rate of fire of torpedo tubes.

Up till comparatively recently, very little attention has been paid to the rate of fire from a torpedo tube. Not only were the loading arrangements clumsy and complicated, but there was generally no provision for placing another torpedo quickly in position ready for loading. During the last year the question of the rapid reloading of submerged tubes has received a great deal of attention, and as a result it is stated by the *Naval and Military Record* that in the Mediterranean as many as three torpedoes have been fired in two minutes from a single tube. In fact, the torpedo, like the gun, is becoming a long range quick-firing weapon. A natural concomitant of long range is more or less wild shooting, and there will be many more misses than heretofore. From this it follows that a larger supply of torpedoes will have to be carried.

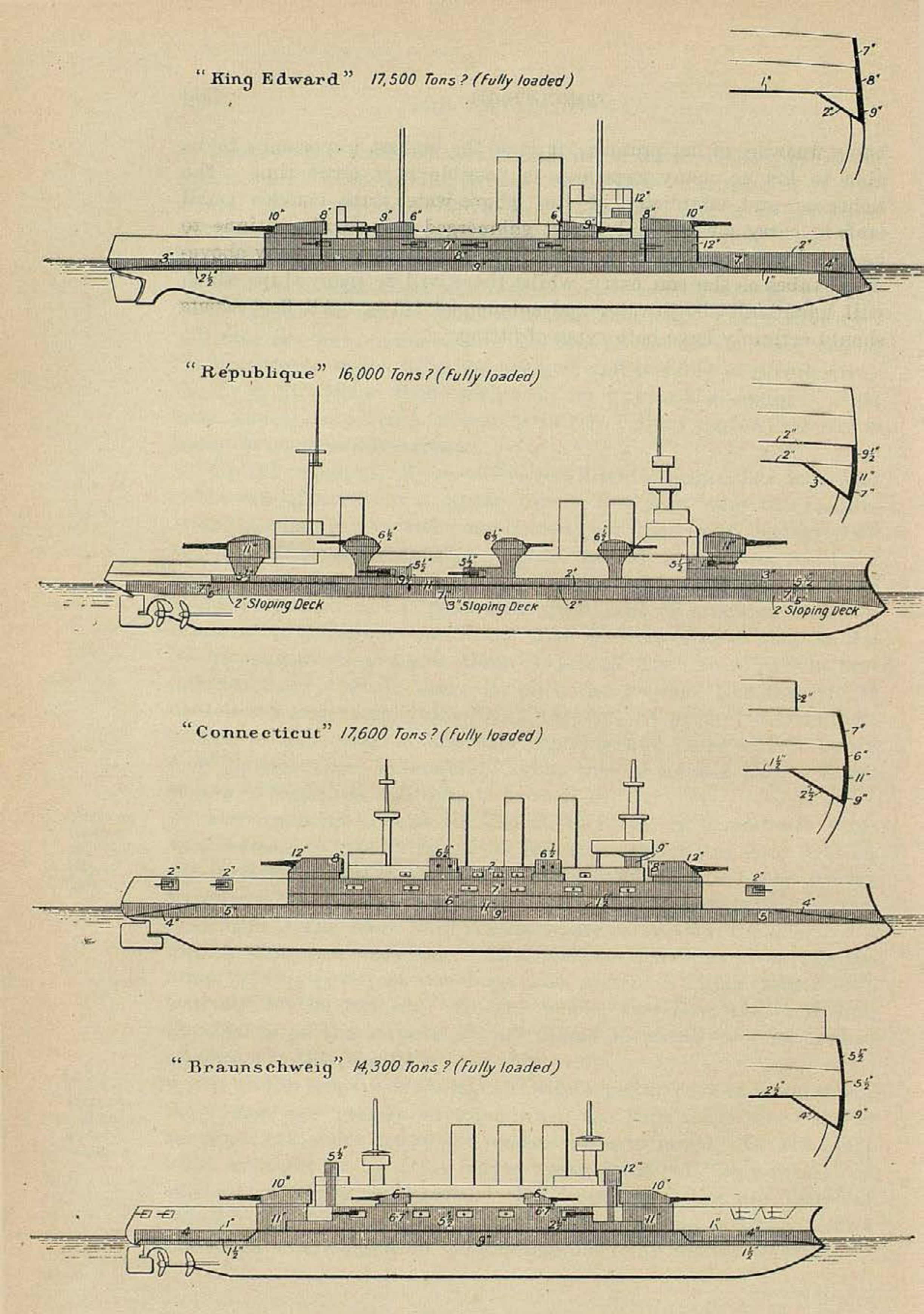
Torpedo warfare and the size of ships.

The argument that as the torpedo increases in importance ships will decrease in size by no means follows. As long as ships fight on the surface the gun will always be important. Guns entail armour to protect them, and big guns and thick armour require large displacement. The large ship is more likely to survive the effect of a torpedo than is a small one. Moreover, two small ships having the same fighting-power as one large one present a larger target collectively to the torpedo. On the whole, therefore, the increasing importance of the torpedo is not likely to entail any immediate alteration in the present type of ship.

Submerged and above-water tubes.

As to the relative advantages of submerged and above-water tubes, the former are greatly superior when the ship using them has to sustain a heavy fire before she reaches torpedo range. On the other hand, at night or in a fog above-water tubes will be well-nigh as efficient as those submerged. Both sets of tubes are therefore valuable, and for any vessel that acts as a scout and is likely to find herself on a dark night in close proximity to an enemy who is pro-

bably unaware of her presence, it is of the highest importance to be able to fire as many torpedoes as possible in a short time. The lightness and simplicity of the above-water tube enables small craft to carry several, and whilst submerged tubes will continue to be fitted to large ships, every small vessel will have as many above-water tubes as she can carry, whilst there will be many ships which will have both above-water and submerged tubes. All fleet scouts should certainly have both types of fitting.



Displacements are approximate within about 300 Tons.

CHAPTER II.

The Thickness and Disposition of Armour.

Changes in conditions governing attack of armour plate.

Although the year 1903–04 has not been signalised by any very remarkable discovery in the way of projectiles or armour plates, there has been a decided advance in the attack, whilst the defence, as represented by the armour plate, remains as before. The attack has profited by the gradual increase of the velocity given by the gun and by considerable improvement in the metal of the projectile. It is some three years since the design of the King Edward class was got out. In these three years the velocity of the latest type gun has gone up about 150 f.s., and the factor of penetration of the armour-piercing projectile has also improved by 10 to 15 per cent. Moreover, the cap, which was then in the experimental stage, has now been universally adopted. From these considerations it results that a 12-in. gun, which in 1901 under certain conditions of range and obliquity of impact might be considered as fairly matched by a 12-in. plate, can now deal with a 15-in. or 16-in. plate on much the same terms as its prototype did with the thinner one.

We should accordingly expect that any ships which are being commenced would be to a new design, with the armour plates made thicker to suit the new conditions. But at present there is no indication of this.

Latest designs of ships.

In England we are content to proceed with ships to the King Edward design, in which the thickest plates are 12 inches Krupp, and these only protect a comparatively small portion of the ship and armament. The water-line armour protecting the engines is no more than the equivalent of 11 inches, allowing full value to the sloping deck, while the resistance of coal-bunkers may be worth another inch and a half in this and other designs. The French are continuing to build to their République design, which, though greatly superior to the King Edward in water-line armour, which equals 14 inches Krupp, has no more than 11 inches on the barbettes. The details of the new Russian and Japanese designs have not yet been announced. The latter ought to be most interesting and instructive, as in the Mikasa the Japanese already possess the best protected ship afloat; and it is

evident, from the increase of displacement, that the new designs are to include certain improvements. In the Mikasa the water-line has the equivalent of 14½ inches Krupp, and the barbettes 14 inches. The Russians, on the other hand, have no very thick armour; in the Borodino class 10-in. Krupp is about the maximum, so that it does not seem likely that anything notable will be developed in Russia. The United States have an equivalent to 14 inches on the Connecticut's water-line, and may possibly modify the armour of the barbettes, which is only 10 inches between decks, but the designers across the Atlantic are being terribly hampered by the determination of Congress to cut down displacements. Indeed, it has been decided to order two ships which are to have the heaviest armament, and yet are not to exceed 13,000 tons. Solomon himself, after a 10-years' course of naval architecture, might well give up such a problem in despair! The Germans and Italians are also hampered by small displacements, and, though the ingenuity of their naval designers is great, it seems most unlikely that they can produce anything really worth copying in Great Britain.

Piercing power of guns now being manufactured.

With regard to the piercing power of the guns which will be supplied to ships to be laid down this year, if we take the velocity at 2800 f.s., not a high estimate, we get:—

PENETRATION OF KRUPP STEEL BY ARMOUR-PIERCING SHOT OR SHELL.—NORMAL IMPACT.

Muzzle Velocity 2800 f.s.	2000 yards.		3000 yards.		4000 yards.		5000 yards.	
	Old Type Shot. Uncapped.	New Type Shell. Capped.	Old Type Shot. Uncapped.	New Type Shell. Capped.	Old Type Shot. Uncapped.	New Type Shell. Capped.	Old Type Shot. Uncapped.	New Type Shell. Capped.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
12 inch (850 lbs.)	18	22	16	20	14	18	13	16
9·2 inch (380 lbs.)	12	15½	10	13	8½	11	7½	10
8 inch (250 lbs.)	10	13	8	10½	6½	9	5½	7½

There is only one nation, namely, Germany, that has not adopted the 12-in. gun, so that this may be regarded as the weapon which the new ships will have to face. If the armour be expected to give security from this weapon at, say, 3000 to 4000 yards, this is surely not asking too much. The table shows that the belt abreast the King Edward's engine-room, with 9 inches Krupp + a 2-in. mild steel sloping deck + a coal bunker (worth 1½ inches of Krupp), and a total

resistance equal to 12 to 13 inches Krupp, can be pierced with the greatest ease by the old type 12-in. shot at over 5000 yards, whilst the 9·2-in. or the German 9·4-in. would, if it hit exactly normal, send a capped shell into the engine-room or barbette at between 3000 and 4000 yards.

Hitherto it has always been the object, in armouring a first-class battleship, to keep the enemy's shot from piercing engine-rooms and big gun positions till the ships closed to about 3000 yards. This was accomplished in the Royal Sovereign, Majestic, Bouvet, Indiana, Formidable, and others. But at present, both in England and abroad, the armour provided for first-class ships, costing nearly a million and a half, will barely keep out capped shot from the 9·2-in. at moderate ranges, whilst the 12-in. gun pierces easily at considerable obliquity at, say, 5000 yards. Twelve years ago every ship had 16 to 18 inches of armour, and now, although ships have increased in size, we are content with 12 to 14. The practice of the day is most unreasonable in view of the great improvement of guns and projectiles. We are likely to get some useful object-lessons during the present war, and one will almost certainly be, that armour, to be effective, must keep out both shot and shell until the ships come in to really close quarters.

Over-anxiety about the protection of flotation.

The reason for the reduction of the thickness of present-day armour seems to be that there is more anxiety to keep the ship afloat, by spreading out the armour so as to keep out common shells all along the waterline, and less consideration for the safety of the men who fight the guns and keep the engines going. By the time these words are printed and published, we ought to have more data from the Far East, but it should not be forgotten that, in previous wars, it is always the protection of the *personnel* that has been found to be most important. It is no use having a ship sound and seaworthy if her gun crews are out of action,* or if the cutting of steam-pipes has rendered the engine-rooms and stoke-holds untenable. Such a ship would form a useful prize for the enemy, but she would only be a burden to her friends. It is perfectly evident that in order to safeguard what is essential, we must sacrifice what is non-essential, thickening the armour in certain parts, and reducing or abandoning it elsewhere. It is therefore proposed to make a careful survey to ascertain in what direction improvement can be made, and as it is easier to correct and revise than to start *de novo*, we will take the King Edward class as representing the latest British design, the details of which are known, comparing it with others, and making suggestions for such changes in a new design as may tend to greater efficiency.

* The case of the Variag.

The armour at the water-line of a battle-ship.

The greatest weight of armour has been devoted, from the very earliest days of ironclad ships, to protecting the "vitals," as they are called, and for this purpose it is placed on or near the water-line. It is, of course, vital that a ship should float, but whether such gear as the hydraulic machinery for working the turrets or the dynamos and ammunition lifts are more vital than the guns and mountings themselves is a very open question; and instead of calling everything low down in a ship vital we should prefer to say that the water-line armour is primarily to co-operate with the water-tight compartments in keeping the ship afloat, and is also for the protection of the engines, which are necessarily placed near the level of the water-line. In British types of ships the distribution of ammunition is carried out under the shelter of the belt, but in several foreign designs there is a direct vertical delivery to each gun from well below water, and very few men are employed at or just below the level of the water-line.

Area of belted side.

The breadth of the belt must depend mainly on the amount that the ship is expected to roll, because the upper part must be high enough not to be constantly immersed, whilst the lower edge must not roll out of water in ordinary weather. The breadth of the belt may therefore be considered as a factor of the beam. Similarly the length of the broad part of the belt may best be compared to the length of the ship. If we compare the King Edward with the République, Braunschweig and Connecticut, we notice the following:—

—	Length.	Breadth.	Length of Main Belt.	Breadth of Main Belt.	Fore part of Belt.		Aft part of Belt.	
					Length.	Breadth.	Length.	Breath.
	Feet.		Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
King Edward .	425	78	260	15½	75	18	90	8
République . .	440	79½	280	12½	80	24	80	11 to 7
Connecticut . .	450	77	290	15	90	9	70	8
Braunschweig .	400	73	250	15	80	10	70	8

There is no great disproportion in the area of side belted, though the French belt is notably narrower than the others amidships, whilst the fore part of the belt is much broader in the French and British ships than in the other two.

There is a considerable difference in the method of adjusting the thickness of the armour. Thus—

The King Edward has main belt 9 in., except upper strake (7 ft. broad) which is 8 in.

République has main belt 11 in. thick over a breadth of 5 ft. in the centre; it tapers to 9½ in. at the top and to 7 in. at lower edge.

The Connecticut has main belt 11 in. thick over a breadth of 5 ft. in the centre; it tapers to 9 in. at the lower edge, and the upper strake (7 ft. broad) is 6 in.

Braunschweig has main belt 9 in. thick over a breadth of 4 ft. in the centre; it tapers to 6 in. at lower edge, while the upper strake (7 ft. broad) is 5½ in.

There is a general agreement in plating the bows with 5 to 7 in., but the breadth of the belt, except in the Braunschweig, outside the barbettes differs greatly. The stern plating is only 3 in. in King Edward, 7 in. in République, 7 in. to 4 in. in Connecticut, and 4 in. in Braunschweig.

The principal difference is that the British ship is content with 9 in. at the thickest part of the belt, whilst the French and American ships have 11 in. The lower edge of the British belt is thicker than that of any other ship, the upper portion of British and French belts is also from 1 in. to 1½ in. thicker than the others. The German ship, owing to her small size limiting the weight, has to be content with a belt 9 in. thick in the centre, 6 in. at lower edge, and 5½ in. top strake, but her belt is of the same type as that of the French and American ships—viz., with a thick band abreast engines and boilers, whilst the upper and lower portions are thinned off.

The reason for the careful adjustment of the thickness of the belt in the foreign ships is clear enough. The lower edge is tapered because it cannot be hit unless the shot has traversed some water; the upper portion is thinned because a shot piercing here will not damage engines or boilers. Moreover, a hole 5 or 6 ft. above water can be easily plugged. There is no doubt that the foreign plan is preferable to ours, and that the British belt would be very much improved if the central 5 ft. was thickened up.

Behind the lower 5 ft. of the belt comes the slope of the armoured deck, of which the thickness is—

		Equivalent to Vertical Krupp Armour.
King Edward	2 inches mild steel	2 inches.
République	3 ,, hardened steel . .	3½ ,,
Connecticut	2½ ,, ,, ,, . .	3 ,,
Braunschweig	4 ,, ,, ,, . .	5 ,,

This deck ought to stop a shot or shell which has pierced the belt, and prevent it from entering the ammunition passage, engine room or stokehold. The King Edward is at a decided disadvantage as compared with the other ships; not only is the deck thinner, but it is not hardened. The Braunschweig makes up for her somewhat thin belt by her excellent deck. If the resistance of coal bunker

and ammunition passage be equal to another inch and a half of Krupp steel, we get:—

	Total Resistance to be Overcome before piercing Engine Room or Stokehold.	Range of Piercing, 12 in. Gun, Uncapped Shot.
King Edward . . .	12½ inches . .	5500 yards.
République	14½ to 13 inches . .	3700 ,,
Connecticut	14 ,, 12 ,, . .	4000 to 4500 yards.
Braunschweig . . .	14 ,, 11 ,, . .	4000 ,, 5000 ,,

The lower figures for the foreign ships represent the lower edge of the plate, which is immersed some 6 ft., and which only rolls out of water with a roll of 9 degrees, a most improbable inclination in ordinary weather.

Suggestions for future designs.

Any future design should have a belt of the foreign type 11 to 12 in. thick in the centre, tapering to 9 in. below, and not more than 7 in. from, say 4 ft. above water to the top. To effect this the British belt requires a band of metal, some 2½ in. thick and 5 ft. broad, to be added to the centre, but an inch may be taken off the upper strake. The slope of the armoured deck should be of the German type of 4-in. hardened steel. The weight to thicken belt and deck could be taken, in the King Edward, from (*a*) the ram, (*b*) the upper deck, (*c*) the main deck before the fore barbette, which is some 12 ft. above water and 2 in. to 1½ in. thick, besides which the displacement might be increased. The main deck of the French ship might be reduced to 1 in., whilst there is not much saving to be effected in the American or German ships, save by lowering or shortening their armour, but the 2-in. plating of the 14-pdrs. in Connecticut might go. The German ships, being only 14,300 tons, would be very greatly improved by being increased some 3000 tons. The breadth of the belt as at present fitted is about 15 ft., except in France, where it is some 3 ft. narrower. The drawback to a narrow belt is that its upper edge may roll under. Still, the French belt allows of a roll of 10 deg., and this appears sufficient. At the upper edge of the belt the French ship has a 2-in. deck, which also exists in the British Queen, Bulwark and Duncan classes, but is absent from the King Edward, as well as the German and American designs. This deck is to prevent water finding its way over the edge of the belt through holes made in the unarmoured side above, and thence making its way down below. I do not consider that it is worth its weight, and might be reduced to 1 in. or less. The reason that it has been discontinued in the King Edward, Connecticut and Braunschweig is, however, that the belt has been added to by building a box battery on the main deck, which increases the total breadth of side armour to some 24 ft., and gives an armoured freeboard of some 17 ft. for a length of 220 ft. or more. The large area of the upper

deck covering this battery is in the King Edward plated with 1 in. of steel, but the Germans and Americans appear to dispense with this weight. It can scarcely be contended that the box battery is necessary for keeping the ship afloat, it is essentially for the protection of the secondary armament, and its height above water is mainly arranged that the guns may be fought in a seaway. I believe it is quite possible to mount 7·5-in. guns on the broadside, in a structure in which the highest part of the side plating is not more than 15 ft. above water. To resist capped shot the battery armour might be sloped as in the original Merrimac of the Civil War. If there are good turrets on deck, these should do the bow and quarter fire, and the main deck battery might be placed well aft and restricted to guns bearing from 60° before to 60° abaft the beam, which do not need to be so high above water as guns in recessed ports.

Little has been said about the armour at the ends, but there is no doubt that, in the King Edward and her contemporaries, a considerable weight of armour has been added before the fore barbette and a good deal abaft the after barbette without any very sufficient reason, seeing that it is far better to take in a certain amount of water at the ends than to have shell penetrating into engine-room, stokeholds and main barbettes. The upper armoured deck forward, 12 ft. above water, is certainly unnecessary, and a modest amount of 5-in. side armour should suffice. Armour of this thickness will stop a 6-in. or 6·5-in. shell, except at close ranges, and though it can be pierced by 7-in. or heavier guns, the holes would be little greater than the size of the projectile and would be easily plugged. Theoretically a 12-in. high explosive shell might knock a good-sized hole, very difficult to plug, but this is doubtful under service conditions, and could hardly happen unless the heavy guns of the enemy specially devoted themselves to the very difficult task of smashing up the bows, which would entail letting the main armament alone, since the high explosive shell, which would be particularly formidable to the foremost compartments, would not hurt the barbette. Moreover, guns of less than 12-in. calibre would not pierce the armour at all unless they used shells of small capacity which would not make large holes. And there is no need whatever to have either men or guns in the bows, so that all the weight piled on before the fore barbette is entirely for the exclusion of water. The Braunschweig is content with a very modest weight of 4-in. side armour before and abaft the barbettes, and it is decidedly preferable to do as the Germans do, and to limit the weight here in order to have more to apply where it is really needed.

Armour at ends.

With regard to the flat portion of the armoured decks, the King

Edward's lower deck is only 1 in. amidships, the Connecticut 1½ in., the République 2, and Braunschweig 2½ in. As this part of the deck is mainly to stop splinters of shot or shell that have pierced the upper part of the belt, which is only 5½ in. in the Braunschweig and 6 in. in the Connecticut, whilst the King Edward has 8 in., the latter ship is justified in having the deck thinner. The République has much the best protection here, as the top of the belt is 9½ in. and the deck 2 in. On the whole, there can be no doubt that the French ship gets better protection on the water-line than any of the others, and it seems likely that, owing to the narrowing of the belt, the weight expended is no more than in the King Edward, if as much. The only item that appears unnecessary in the French design is the heavy 2-in. deck at the top of the belt, which might be reduced to 1 in. or less. The French ship carries a fair amount of armour before the fore barbette, but not nearly as much as the King Edward; most of it is only 3 in. thick and the rest but 5½ in. The Japanese battleships all have very narrow belts at the ends or none at all, and it will be most interesting to notice if these ships show much tendency to take in an undue amount of water during or after an action. It must be remembered that the Ting Yuen and Chen Yuen, which stood a good hammering at the Yalu in 1894, were both entirely unbelted at the ends.

Summary as to water-line.

On the whole, it cannot be said that the British plan of water-line protection has any superiority over the foreign designs. All the ships are defective in having plating abreast engines and boilers too thin, and the King Edward is decidedly the worst in this respect, and there is no definite countervailing advantage. Of the four designs, that of the Braunschweig appears to be the best, and if she had not been kept down to 14,300 tons, as against King Edward's 17,500, she could have so thickened her armour as to be very superior. The République has the merit of saving weight by narrowing the belt, and the Connecticut does well in not overloading the ship before and abaft the barbettes.

Armour protecting heavy guns.

—	Thickness of Armour.				Diameter of Barbette.
	On Gun.		On Barbette.		
	In Front.	At Sides.	Top.	Bottom.	
	Inches.	Inches.	Inches.	Inches.	Feet.
King Edward . . .	10*	8*	12	12 to 14	34
République . . .	11	11	11	11 to 12	26 (mean diameter of turret). 18 to 12 below.
Connecticut . . .	12*	8*	11	13 to 12	25
Braunschweig. . .	10	10	11	11	25

* Sloping.

When the water-line armour is settled the next point is to provide for the protection of the heavy guns, which in all ships are placed in hooded barbettes or turrets towards the ends. With regard to the protection afforded, all the designs are faulty in having the armour too thin. None of these structures is perfectly safe if attacked by the 9·2-in. gun with latest type capped projectile, unless outside 3000 yds., whilst the 12-in. gun will pierce at 7000 yds. or more, if it hits direct. A proportion of hits will always glance off the sides of the turret or barbette, and the centre half may be taken as the effective target. The outside edge of this centre part subtends an angle of 30 degrees with the line of fire. A 12-in. shot at this inclination will pierce at about 4000 yards, but the 9·2-in. will glance off at all ranges over 2000 yds. unless it hits almost direct. All the armour is too thin, especially that of the Braunschweig. The hood of the King Edward is also notably thin. The large size of the King Edward's barbettes as compared with the other designs is a decided disadvantage. A larger target is presented, and there is no countervailing gain. The foreign designs, though small in diameter, in all cases have the turret thoroughly well supported, and there seems sufficient room for the loading gear.

Although the general arrangements of the turrets or hooded barbettes is not dissimilar in the four ships, there are some noticeable points of difference. All the turrets or gun hoods are oval, so as to be as light as possible, and to present a small target to the enemy's fire. In the American design the front part of the hood, through which the gun ports are cut, is the thickest part of the armour exposed to attack. In the British design this plate is two inches thinner than that of the barbette below. The American plan is the best. Again, in the King Edward and Connecticut the sides of the hood or turret are thinner than the front, whilst in the French and German designs the turret is equally thick all round. The thinner side plate effects a useful saving of weight, and it is quite thick enough, as it can only be hit obliquely. The weight of the barbette ought to be considered in connection with that of the gun and mounting,* and the designer would then have more inducement than he has at present to cut down weights.

Protection to secondary armament.

Lastly we come to the protection for secondary armament. Three ships out of four have a box-battery amidships, reaching from the upper strake of the belt to the upper deck, with four turrets superposed. The République alone dispenses with the battery, and has six

* In the classification of weights in a British ship the weight of the barbette is considered quite apart from that of gun and mounting. The weight of the latter is strictly limited, that of the barbette is never mentioned, and seldom considered.

turrets, three each side of the spar deck, on the same level as the foremost 12-in., whilst the rest of the eighteen 6·5-in. guns are placed, two in casemates, on each side of the upper deck forward, and four in casemates on the main deck amidships. Thus we have on the one hand a combination of the box-battery and turrets, and on the other, scattered casemates and widely separated turrets entirely independent of the casemates, the said turrets, with their ammunition tubes, resting on the main deck, which closes in the top of the belt. The box-battery acts as a supplement to the belt, in that it would assist the flotation of the ship when, through water-line injury, she gets deep in the water. The belt may, in the box-battery ships, be considered to reach as high as the lower port sills. In the French design the armour for protecting the secondary armament does not in any way assist the flotation. The upper armoured deck, however, on which the turret bases rest, acts both as a support to the turrets and for water-excluding purposes. The casemates are too small to have any influence on the flotation. It is to be noted, however, that they are armoured all round, and have not the weak backs of the British type of casemate.

Box battery.

Supposing it was decided to convert the French design into the box-battery type, there would be available the armour of the six casemates and most of the 2-in. deck armour, as well as that on the turret ammunition tubes. So that but little weight can be saved by the French plan ; its main advantage is that the scattered guns are hard to hit, and the twelve guns in turrets have a splendid arc of fire. The corresponding disadvantage of the box battery is the liability to extensive damage by a single heavy armour-piercing shell which may traverse the armour and burst inside. To reduce this risk all the box batteries are provided with traverses between the guns. In the British and German ships the battery is subdivided into two compartments, and in the Connecticut into three. Yet the traverses are so short, some 15 ft. or less, that the gas from a 12-in. armour-piercing shell would pass round the end of the traverse and silence every gun in the compartment. It is evident that the lessons taught by the explosion of the 12-in. shell at the Yalu river fight have been ignored in the West. The Japanese, taught by their experience, very rightly insisted on every gun in the Mikasa being in a separate compartment. The Triumph and Swiftsure are also similarly fitted. The traverses and bulkheads inside the battery of the King Edward are 2 in., and in the Connecticut 1½ in. If reduced to 1 in. or thereabouts they would suffice to enclose each gun. A 1-in. bulkhead will stop the rush of gas from the biggest shell, and most of the fragments will also be stopped. A 2-in. plate will not stop the head and base of a big shell, thus there are not many fragments which

would pierce a 1-in. plate and be stopped by a 2-in.; but if the gas be not stopped, it will put men out of action at a great distance. In the Hiyei, at the Yalu, a 12-in. shell burst in the ward-room. The ½-in. bulkhead of the steerage saved some of the men on the other side of it, but those in the wake of the open water-tight doors were all killed or wounded. The gas travelled some 70 ft. to another bulkhead, passed through an open door, and put out of action three men on the further side, some 80 ft. from the place of burst. Again, in the box battery of the Matsushima a shell entered the port side forward and caused an explosion of ammunition. The gas did not damage the ⅜-in. plating of funnel casing, but rushed along the deck between the funnel casing and the ship's side, putting out of action several men who were 80 to 100 ft. from the point where the shell entered. In no case was a man injured by gas when even a ⅜-in. plate cut him off from the locality of the explosion. On the other hand, the gas went round various obstacles, killing men who were quite out of sight of the point where the explosion took place. As to the thickness of the side of the box battery, the King Edward and Connecticut have 7 in. and the Braunschweig only 5½ in. The République's casemates are also only 5½ in. The British and American ships have a decided advantage here. They are absolutely safe when attacked by the 6·5-in. gun, and fairly safe when the 7-in. is used.

Above the battery are placed the turrets for the rest of the secondary armament. In the British and German ships there is only one gun in each turret, but the French and Americans have two in each. If to double the number of guns in a turret is to double the rate of fire, there is no doubt as to the superiority of the twin system. But there does not seem any general agreement in the matter. We have always neglected the turret for medium and small guns, thus our experience is small, and our only turrets with twin guns, those in the County class, with two 6-in. in each, are regarded as unsatisfactory. On the other hand, the single 9·2-in. guns in the turrets of Terrible, Drake and Cressy have given excellent results. The Germans have used turrets largely for their 6-in. guns in nearly all their new battleships, but they are all single gun turrets, and they still adhere to them. The United States have always put two 8-in. guns in a turret, and this they are doing still. But their rate of fire has been slow, and it is doubtful if, as hitherto mounted, a pair of American 8-in. guns will fire any faster than a single British 9·2-in. The French have changed their minds continually, and they do not lack experience. Thus the Dupuy de Lôme, 1890, the Bouvet, 1896, the Suffren, 1900, and the Liberté, 1902, all have single turrets, Turrets.

whilst the Jauréguiberry, 1892, the Dupleix, 1900, République, 1901, and Renan, 1903, have twin turrets in every case. The latest ships, the modified Républiques with 7½-in. guns are to have a combination of single-gun turrets and casemates—3 turrets and 2 casemates each side. Since the battleships' secondary guns seem likely in the future to be anything between 7½-in. and 9·2-in. calibre, the French experiments with single-gun and twin turrets for 5·5-in. and 6·4-in. guns are not much to the point, and it is possible that twin guns may do well when the calibre is 6-in., and not when it is 9·2-in. Very useful experience ought to be gained with the twin 10-in. guns in Triumph and Swiftsure, as against the 9·2-in. guns of Aboukir and Hogue, which ships have recently done some very rapid firing from their single-gun turrets. The protection of the secondary turrets is as under:—

	In Front.	At Sides.
King Edward	9 inches. . . .	6 inches.
Connecticut	6½ „ . . .	6 „
République	6½ „ . . .	6 „
Braunschweig	6 „ . . .	6 „

Power of secondary guns.

And the penetrating power of secondary guns, assuming 2800 f.s. velocity:—

PENETRATION OF KRUPP ARMOUR—DIRECT IMPACT.

—	2000 Yards.		3000 Yards.		4000 Yards.		5000 Yards.		Remarks.
	Old Type Shot Uncapped.	New Type Shell Capped.	Old Type Shot Uncapped.	New Type Shell Capped.	Old Type Shot Uncapped.	New Type Shell Capped.	Old Type Shot Uncapped.	New Type Shell Capped.	
	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	
9·2-in. (380 lbs.)	12	15½	10	12½	8½	11	7½	10	British.
8 „ (250 „)	10	13	8	10½	6½	9	5½	7½	American.
7·5 „ (200 „)	9	11½	7	9½	6	8	5	6½	British & French.
7 „ (165 „)	8	10½	6½	8½	5½	7	4½	6	American.
6·7 „ (154 „)	7½	9½	6	7	5	6½	4½	5½	German.*
6·4 „ (135 „)	7	8½	5½	6½	4½	6	4	5	French.
6 „ (100 „)	5½	7	4½	5½	4	5	3½	4	British.

* The German gun is only 40 cals. (over all), all the others are 50 to 52 cals. It is unlikely that 2800 f.s. will be obtained, and its power is therefore really the same as the French 6·4-in.

The 8-in. is the smallest gun that is moderately satisfactory for the attack of the King Edward and Connecticut's batteries, whilst the turrets for the King Edward's 9·2-in. gun are safe against the 8-in.

with old type shot at 2500 yards. Even the extra penetration attained by the latest type armour-piercing shell does not render the 6-inch efficient against a 5½-in. plate, for it only just gets through at 3000 yards. Notwithstanding improvements in gun and projectile, the 6-in. gun may be disregarded as an armour-piercer, and the French 6·4-in. and German 6·7-in. are of no practical value against 6-in. plating at ordinary fighting ranges. No ship laid down abroad in 1903 will carry smaller guns in the secondary batteries than 6·7-in., whilst our latest ships are still being built to the King Edward design, with ten 6-in. guns. The design is to some extent redeemed by the excellent 9·2-in. guns, well mounted and well protected, but of the seven secondary guns on the broadside, only two are 9·2 in., whilst the Americans have four 8-in. and seven 7-in., and the French, in their latest designs, five 7½-in. The Germans were reported to be introducing 8·2-in. guns in their latest battleship designs, but this is now contradicted,* and both the Russian and Italian ships have 8-in. Under these conditions the new King Edwards will not find the 7-in. armour on the box-battery altogether satisfactory, and it seems inevitable that if the secondary armour were thickened it would not be possible to carry both box-battery and turrets, and the former will have to go. With turrets of the French type it may be found possible to carry six 9·2-in. on the broadside. If single-gun turrets are found best, the endeavour will be made to instal four a side. The light Q.F.'s for repelling torpedo craft would be entirely in the open, above the secondary turrets.

In conclusion, there is very general agreement as to the principles on which armour is to be applied at the water-line, namely, a belt thick enough, when taken together with the sloping deck, to keep armour-piercing projectiles out of the engines; but all existing designs are unsatisfactory, as the thickness of armour is insufficient. The belt must be long enough to shield the large midship compartments from being filled with water, and broad enough to keep the upper edge out of the water. If narrow, it must be topped by a thickish deck, but with a broad belt the covering deck may be thinned without undue risk. In any case, there must be adequate protection against the ingress of large bodies of water; but it is better to have some water on board than to have the armour pierced and the engines and ammunition supply disabled. All the principal armament will be in turrets, of which the end turrets will carry the heavy armament and the broadside ones the secondary guns. All the turrets will be as high up as possible consonant with stability, but the forward ones Conclusion.

* The necessity for keeping down displacement may account for the retention of an unsatisfactory gun.

higher than those further aft. Even the secondary turrets will carry some 8 or 9 in. of armour, and the principal ones 14 to 16, the existing armour being insufficient here, as it is on the water-line. The thickening of the armour on the guns must entail a reduction in their number. The eighteen secondary guns of the French and German battleships are already condemned as too numerous, and it seems not impossible that the Americans, before they complete their latest designed ships, may have to give up some of the twenty heavy Q.F.'s. (eight 8-in., twelve 7-in.). With fewer guns it will be most important to increase the rate of fire and to give each gun as wide an arc of training as possible, and the point which presses for immediate decision is whether the secondary guns should be placed two in a turret, or whether—in view of the difficulty of getting rapid fire from a two-gun turret—single-gun turrets should be adhered to, except for the heaviest guns.

CHAPTER III.

Progress in Guns and Gunnery.

Illustration of progress in guns in last eleven years.

In the present summer two new battleships will take their place in the Home Fleet. The Triumph and Swiftsure, the ships in question, having been built by private firms for a small Power their designers were not so much hampered as those of our own ships have frequently been by the desirability of having as few changes as possible in armament and fittings. Hence it comes to pass that their guns are of the very latest type and embody the very latest improvements in mountings and ammunition. The two flagships of the Home Fleet are the Revenge and Empress of India, ships just over ten years old, which at the time they commissioned were two of the most successful and powerful ships then existing. It will be instructive to compare the guns with which these ships are supplied :—

	Gun.	Weight.	80 Rounds of Ammunition. Weight.	Muzzle Velocity.	Uncapped Shot, Penetration 3000 yards.		Rate of Fire. Rounds per Minute.	Shell Fire. Weight of Shell Fired per Minute.	Estimated Hitting Power, against a Battleship, 3000 yards, in 10 Minutes.	
					Wght. Iron.	Krupp Steel.			Hits.	Shell.
		tons.	tons.	f.-s.				lbs.	No.	Weight. lbs.
Revenge .	13·5″ 30 cal.	67	67	2000	25·2	11·1	0·4	500	1·2	1500
Triumph	10″ 45 cal.	31	28	2800	27·0	12·0	1·2	600	4·8	2400

Comparison of heavy guns—10-in. new versus 13·5-in. old type.

The principal function of the heavy guns is to pierce the enemy's armour, and either to let in water or to destroy engines, boilers, guns, mountings, and men protected by that armour, so that, provided the projectile is heavy enough to disable a gun if it gets through, the best gun is the one that puts in most piercing hits in a given time. Assuming that the flat trajectory of the 10-in. gun and the shorter intervals between rounds, as well as the better mounting, enable it to put in 40 per cent. of hits as against 30 per cent. by the 13·5-in., a single 10-in. gun when used against penetrable armour will in a given time put in four times as many effective hits as the 13·5-in. Moreover, at 3000 yards it takes a 12-in. plate to stop the 10-in. shot, but the 13·5-in. can be stopped by an 11-in. plate. If both guns are beaten by the thick armour and have to use common shell, the best standard of comparison is the weight of metal that hits in a given time. Judged by this standard the 10-in. is superior in the

proportion of eight to five. The weights of guns with ammunition are—13·5-in., 134 tons; 10-in., 59 tons, or in the proportion of nine to four, the 10-in. being by so much the lighter. Thus, although the weight of the guns and ammunition has been reduced by more than a half, the efficiency has at least been trebled. Although the security of the guns' crew must lead to better shooting, we have not taken into account the protection of the guns in estimating the rate of hitting, but here too the 10-in. has a great advantage. The 13·5-in. guns have no hoods and are much exposed; the 10-in. have excellent hoods, presenting but a small target, whilst the guns are kept pointed at the enemy whilst loading. The 13·5-in. guns when fighting on the broadside have to be turned fore and aft to load, thus exposing the gun to be hit on the side. The 10-in. are mounted in a small barbette which does not offer two-thirds of the target given by that for the 13·5-in., whilst the 10-in. Krupp armour on the new ships' barbettes is about equal in resisting capacity to the 17-in. compound armour on the older ships.

Comparison of secondary guns.

It is difficult to make a similar comparison between the 6-in. Q.-F's. of the Revenge and the 7·5-in. guns of the Triumph. The latter guns are immeasurably superior, especially in home waters, because they can pierce 6-in. Krupp steel with an uncapped shot at 4000 yards; and there is no foreign ship yet afloat in these seas that has even 6-in. on her secondary armament. The 6-in. gun (M.V. only 2150 f.s.) on the other hand, is practically beaten by a 3½-in. plate at 3000 yards, and there are very few ships whose secondary guns have not this protection. The modern 7·5-in. has in fact about double the penetrating power of the 6-in., and would readily pierce the average protection of the secondary armament, whilst the 6-in. would do nothing unless it hit a port. It is true that it has two and a half times the weight of the 6-in., but it obtains nearly four times the energy, and is well worth the extra weight. The only possible basis of comparison in which the 6-in. is not outclassed is as shell guns. Here it is quite likely that the 6-in. owing to its greater rate of fire, which we may estimate at one and a half times that of the 7·5-in., may not be so far behind notwithstanding its low velocity and high trajectory. Thus it seems probable that the inaccuracy due to high trajectory would be compensated for by greater rate of fire, and that the lighter gun could put in hit for hit with the heavier. But the 6-in. shell weighs only 100 lb. to the 200 lb. of the 7·5-in., so even on this basis the 7·5-in. is worth two of the other. The new 7·5-in. gun may more profitably be compared with the old type 10-in. as mounted in the Centurion; it has the same penetration at 3000 to 4000 yards, and when used as a shell gun can put in slightly

more weight of metal in a given time. As it fires at least two and a half times as fast, and is more accurate, it is greatly superior for attacking such armour as is penetrable by both guns. Allowing for the lighter projectile the superiority of the 7·5-in. as an armour-piercer may be put at two to one. Thus the 14 guns in the Triumph's casemates are equal or superior to, say, twenty 10-in. guns of the date of Revenge's armament, and their protection is excellent, decidedly better than that of the 10-in. guns in the Centurion or Renown, and infinitely superior to the casemate armour of the Revenge.

Owing to the superiority of the new armament, the two new ships, Triumph and Swiftsure, could fight the whole five ships of the Royal Sovereign class now in the Home Fleet, with a very fair chance of success.

Replacement of old type guns in foreign ships. Their retention in our own Navy.

Speaking generally, a gun of the present pattern is distinctly superior to one of twice its weight of ten years ago. This has been thoroughly realised abroad, and there are very few important ships outside the British Navy which still possess 30 calibre guns.

IMPORTANT SHIPS WITH 30 OR 35 CALIBRE MAIN ARMAMENTS.

30 Calibre Guns.		35 Calibre Guns.	
British.	Foreign.	British.	Foreign.
1st Class Battleships.	*1st Class Battleships.*	*1st Class Battleships.*	*1st Class Battleships.*
Royal Sovereign.	FRANCE.	Majestic.	FRANCE.
Revenge.	Nil.	Magnificent.	Nil.
Empress of India.		Mars.	
Royal Oak.	UNITED STATES.	Jupiter.	UNITED STATES.
Ramillies.	Iowa.	Prince George.	Kearsage.
Resolution.	Indiana.	Victoria.	Kentucky.
Repulse.	Massachusetts.	Cæsar.	Alabama.
Hood.	Oregon.	Illustrious.	Illinois.
8	4	Hannibal.	Wisconsin.
2nd Class Battleships.	RUSSIA.	Canopus.	5
Renown.	Nil.	Glory.	RUSSIA.
Centurion.	GERMANY.	Albion.	Sevastopol.
Barfleur.	Nil.	Goliath.	Poltava.
Nile.	*2nd Class Battleships.*	Ocean.	Petropaulovsk.
Trafalgar.	FRANCE.	Vengeance.	3
5	Nil.		GERMANY.
2nd Class Cruisers.	UNITED STATES.		Worth.
Blake.	Nil.		Weissenburg.
Blenheim.	RUSSIA.		Brandenburg.
St. George.	Nil.		Frederick Wilhelm.
Crescent.	GERMANY.		4
Gibraltar.	Nil.		
Edgar.			
Grafton.			
Royal Arthur.			
Theseus.			
9			
Total . . 22	Total . . 4	Total . . 15	Total . . 12

Even if the Edgar class be omitted there are 28 British ships with the short old type guns, as compared with 16 in the navies of all the four other principal sea Powers. And if the Majestic and Canopus class be eliminated because their guns though short are very good of their type, there are still 13 British battleships whose principal guns are very inferior, and their mountings are also indifferent. Considerable sums have been lately spent on many of these ships in improving the Q.F. guns and their protection. They are officially rated as first class battleships, and much would be expected of them in case of hostilities. If, as seems likely, the question of replacing the out-of-date guns has been considered and rejected, it would be better to disrate the ships to the second or third class, and make up the necessary tale of first class battleships by building new ones, which would carry the much needed heavy secondary guns in lieu of the outclassed 6-in., and also have thicker armour than our recent ships. The large number of indifferent ships in the Russian Navy are, under the test of war, now being rated at their true worth, whilst, on the other hand, the wise determination of the Japanese to have nothing but the best ships, although numbers had to be sacrificed, is bearing good fruit. Thus the truth is being realised that one good ship is worth almost any number of poor ones.

Lack of progress in the present year in design of guns.

There has been no material advance in the designs of guns manufactured this year, nor has the performance of the latest types been much improved by changes in the propellants. Moreover, in some directions it has been necessary to reduce the velocity. A serious accident took place on board the U.S. battleship Iowa armed with 12-in. guns of 35 calibre, which had a portion of the chase unhooped. One of the guns in the fore turret blew its chase off when at target practice, the splinters causing seven casualties to men outside the turret. This gun was using a charge of 205 lb. of smokeless powder, giving a velocity of some 2300 f.s. The gun was originally designed for a velocity of 2100 f.s. and it was considered feasible and safe on the introduction of smokeless powder to increase the velocity by 200 f.s. A similar increase was also obtained in the 35 calibre 13-in. guns of the Indiana, etc., as well as in the old type 8-in. guns, two of which have recently failed in the Iowa. This extra velocity has had to be surrendered as it is considered that the fore part of the gun is not strong enough to withstand the extra pressure due to the smokeless powder charge necessary for the higher velocity. Whether the Americans like ourselves will rest content with their old guns and low velocities in their older ships remains to be seen. At present this seems most probable, for their ordnance

factories have so much to do in providing guns for their new ships that they will not be able to undertake the rearming of their older ones, and their three accidents have warned them not to overstrain the chase of old type guns. France is the country that has recently done most in the way of rearmaments; there, owing to the very few battleships completed in recent years, the plant for making heavy guns has had comparatively little work to do for new ships, and most of their old type heavy guns have consequently been replaced.

With regard to new guns for ships building, Germany, which twelve years ago was extremely progressive, and was equipping the Brandenburg with 35 and 40 cal. 11-in. guns when we were content to give the Revenge her 30 cal. 13·5 in., has made but little progress since. Her latest ships of the Braunschweig class have only 40 cal. 11-in., whilst our corresponding guns in the King Edward VII. are 40 cal. 12-in. and 46 cal. 9·2-in. It may be that in order to save weight in the turret armour the Germans have to keep their guns short, for the longer the gun behind the balancing point the more armour is required to encircle the breech and loading gear. The French, however, so counterbalance their heavy guns that the length in rear of the balancing point of gun and cradle is not great. Thus they succeed in mounting 45 cal. guns in quite small turrets. Moreover, if the oval gun hood as used in England and the United States be adopted, the extra weight of armour from lengthening the gun is not excessive. At present France, Russia, and the United States are all manufacturing 45 cal. 12-in. guns for their latest ships; we are content with 40 cal. 12-in., though there are rumours of a new 45 cal. gun, whilst the Germans still adhere to the distinctly inferior 40 cal. 11-in. Of the minor powers Japan and Italy are believed to have decided on 45 cal. guns for their new ships. Besides the extra velocity which can be obtained from a lengthened gun, there is the additional advantage to a gun mounted on the centre line of the ship that the long projecting muzzle carries the blast clear of the ship's side when firing the foremost guns abaft the beam, or the after guns before the beam. The French ships with their long guns balanced well towards the breech, and their tumble home upper works, are greatly superior to British ships in this respect, and can get 10 and 15 degrees extra training without seriously inconveniencing the men at the secondary guns. The Germans with their short guns must be almost worse off than we are. Admiral O'Neil in reporting the decision to lengthen the American 12-in. gun to 45 cal. dwelt especially on the necessity of taking the blast clear of the secondary armament, and

Equipment of ships building.

the Americans are evidently paying close attention to the effect of blast and its palliation. The very high muzzle pressures of the latest guns entails a very heavy blast, which besides the inconvenience to neighbouring guns is also a cause of inaccuracy, since the violent rush of gas past the base of the shell as it leaves the muzzle tends to unsteady it. At present no guns giving as much as 2800 f.s. velocity have been tested in British battleships or armoured cruisers, but the ships bought from the Chilians will shortly undergo their service trials, and the question of the effect of the blast of the 10-in. guns into the casemate ports will doubtless make itself prominent. It is an incidental defect of the casemate that its wide gaping port is a natural trap for the blast. If guns interfere with each other owing to excessive blast, not only will the rate of fire of the ship be reduced, but the rate of hitting will be decreased in a higher proportion than the reduction of the rate of fire. No captain of a gun can shoot straight when shaken up badly by the blast of a neighbouring gun. It is reported that the 40 cal. 11-in. guns of the Braunschweig class have a very high velocity. If this is so the blast must be especially troublesome, and they cannot possibly fire 45° past the beam bearing without very seriously inconveniencing the secondary armament. A gun may do very well on the proving ground with a large charge, but the blast due to high muzzle pressure may be so inconvenient in a ship that it may be found better to keep the charge within moderate limits.

Present day ballistics and charges.

Far the largest charges are those estimated to be used in the new American guns, namely, 350 lb. for a 12-in. gun, 40-cal. gun giving 2800 f.s., and 46 lb. for a 6-in., giving 2900 f.s. in a 50-cal. gun. With cordite M.D. we shall probably use about 290 lbs. in the 40-cal. 12-in., and, say, 34 lb. in the 45-cal. 6-in., with velocities 2700 f.s. and 2800 f.s. respectively. The French do not apparently use much over 250 lb. in their 12-in., which would give about 2600 f.s. to 850-lb. shell, but this may have been increased for the new ships. The Germans claim to get 2900 f.s. with 600-lb. shell, corresponding to 36,000 f.t. energy in their 40-cal. 11-in., with only 198 lbs. of powder. As the Vickers 45-cal. 10-in., using German nitro-cellulose, only gets 28,000 f.t. energy with 210-lb. charge, either the energy of the German gun must have been overstated, or a larger charge must be used. However, if we take 300 lb. as the standard charge for the 12-in. gun, and put the strength of the propellant as two and a-half times that of ordinary powder, this means that we have an equivalent of 750 lb. brown powder, or fully double the gunpowder charge of a 12-in. gun of 10 years ago. It is this enormous increase in the power of the propellant that has given the

gun of the present day its enhanced value. There seems no essential difference this year in the form of the latest type guns. In all countries alike the fore part of the gun has to be made very thick, so that the exterior of the gun tends to become more and more cylindrical. The earlier American guns had no muzzle swell, but the recent accidents, due to the yielding of the chase of various guns, point to the desirability of strengthening the guns forward, and there is no doubt that a muzzle swell is desirable for this reason; it also tends to reduce vibration, and thus improves the shooting.

Progress in supply of new type guns.

Although no fresh invention has been made during the last twelve months which will enhance the power or increase the ballistics of guns, and though there have been some actual set-backs, because in certain cases the higher velocities obtained in old type guns by the use of slow-burning propellants have had to be abandoned, it must not be assumed that no improvement is going on afloat. Although it is as long ago as 1899–1900 that guns of new type, using larger charges of slow-burning propellants were being rapidly developed, the effect is only just beginning to be felt at sea. The next year or so will see a decided change as new ships come forward with the new weapons, and the improvements of the last five years begin to bear fruit. About four or five years elapse as a rule before the service afloat profits by any advance in *matériel*. Thus in 1899 the United States officially adopted 45 and 50-cal. guns, with velocities of 2800 to 3000 f.s. The first ship to be completely equipped with the new weapons was the Maine, commissioned in 1903, and the 7-in. American gun, which was developed about 1901, will not be seen afloat till the Virginia is ready late in 1905. Similarly, our 7·5-in. gun was being considered five years ago—none are afloat, save those purchased in the Chilian ships. The Queen, just completed, has guns whose design dates from 1896–97, giving only 2500 f.s. M.V., but by next year the King Edward will be at sea with guns whose velocity should reach 2700 f.s., not up to the standard of the Maine or of the Chilian ships, but still a respectable advance. It will be fully three years, if not four, before we actually have in commission ships whose guns reach 2900 f.s. Years ago we had sad experience of ships waiting for guns, but recently we have fallen into the opposite error, for now a new-type gun has to wait a long time before it can get afloat in a British ship, and there is no doubt that our ships completed in the last seven years, though rapidly built, carry an armament which was already somewhat out of date when the pendant was hoisted. Although we beat the foreigners in our speed of shipbuilding, we are almost always behind them in getting weapons of new type into actual use.

Progress in mountings; twin and single gun turrets.

With regard to the mounting of new-type guns, the most important question is the mounting of guns in a turret so as to obtain the greatest rapidity of fire. The excellent pedestal mountings for 6-in. Q.-F. and smaller guns, which give such a good rate of fire and enable the sights to be kept constantly on the target, differ but little in different countries, and there does not seem much scope for improvement here. These mountings are, however, only used in casemates, box batteries, or in unarmoured ships, and they are not suited to the turret. The British twin mounting for 6-in. guns in the turrets of the County class is decidedly unsatisfactory, the rate of hitting for the two guns is not likely to be more than one and a-quarter to one and a-half times that of a single gun. Besides this, the 6-in. gun is out of date, being too small either for battleships or armoured cruisers, whilst the scout class of ships require nothing larger than the 4-in. gun, or at the very outside the 4·7-in. The moderate-sized guns of the immediate future are the 7·5-in. and the 9·2-in. in the British service, the 7·6-in. French, the 8-in. United States, Russian, and Italian, and either the 8·2-in. or the 6·7-in. German. In all these guns the projectile is too heavy to be lifted and loaded quickly enough by hand, thus if any rapidity of loading is to be attained in a cramped turret; machinery must be used. The propinquity of the two guns in a twin turret also makes hand loading very slow, so that even if a fair rate of loading could be attained by hand loading in a single-gun turret, it would not do with a twin-gun armament. So far as we know, the rate of fire of the single-gun 9·2-in. turrets in the British service is at present unequalled abroad. These guns fire three unaimed rounds per minute, and 2 to 2·5 rounds per minute is the ordinary rate of prize-firing as attained by Good Hope, Bacchante, Cressy, and probably by other ships. As the turrets have a good deal of inertia, it is far more difficult to keep the sights on than when working a 6-in. gun in a casemate, so that even if a type of mounting be devised which will admit of loading each gun in a two-gun turret at the rate of 2½ rounds per minute, it may not be possible to fire accurately at a greater rate than, say, 3½ rounds per minute from the turret. Similarly with 8-in. or 7·5-in. guns it is a great question how much the rate of fire for a turret would be increased by putting two guns into it. The Devonshire class are to have four 7·5-in. guns, but it has not yet been announced whether they are to be in four single-gun turrets or in two with twin guns. The latter arrangement is much the best for saving weight and increasing the training, and is therefore preferable, unless the rate of fire with the former is much increased. At any rate, with four turrets only three guns can fire on either beam, whilst with all the guns in

two turrets, the broadside includes four guns. The barbettes or turrets on quarter deck and forecastle, carrying the main armament, occupy a unique position in the ship, and guns mounted there, and there only, can fire on both broadsides. It is thus very important to get an extra gun into this position even at the cost of some inconvenience. Speaking generally, therefore, four guns in two turrets fore and aft are preferable to four in single turrets on the lozenge system. At present all British cruisers have only single guns fore and aft, but the Japanese, Americans, and Germans are doubtless right in putting pairs of guns into the main turrets in their latest cruisers. Having put pairs of guns in the principal turrets at the ends any other turrets on the broadside may reasonably enough contain single guns. As to the rate of fire which has been attained by twin guns in foreign turrets very little is known, and it is quite possible, if not probable, that it is by no means rapid. The American battleships of the Oregon class certainly fire very slowly from their 8-in. guns, and probably do not attain more than two and a-half rounds per minute from the turret, so that a single British 9·2-in. would about equal them in rate of fire. But the Americans may be trusted to make many improvements in their new mountings for their latest battleships, and there is no reason to doubt that they intend their 8-in. guns to be quick-firers.* It is therefore most necessary that the problem should be taken in hand seriously at home, and that twin mountings to give rapid firing should be designed for both 7·5-in. and 9·2-in. Useful experience will doubtless be gained in the Triumph and Swiftsure, as the trials of the twin 10-in. mountings in those ships may be expected to give valuable data for designing 9·2-in. mountings for the principal guns of heavy cruisers and for the secondary armament of battleships. Whether the latter guns should be in single or double turrets would depend on these trials. Four turrets on each broadside, with one 9·2-in. in each, might be found preferable to three two-gun turrets. They might be expected to give the same, or nearly the same, rate of fire, and would be harder to knock out. The twin mountings for the 7·5-in. would be required for the main armament of the smaller armoured cruisers, whilst the broadside guns of these ships would probably be better in single turrets, as in the battleships and larger cruisers. So far as is known, no nation has yet succeeded in obtaining anything like three rounds per minute from a pair of guns of 7-in. calibre and above. A

* The average rate of fire attained by 8-in. guns in U.S. ships at prize-firing is reported as 1·4 rounds per minute. It is understood that in twin-gun turrets the guns fire singly, thus all the resources of the turret are devoted to firing one gun rapidly, and the rate per gun would decrease considerably if both guns were firing.

decided advantage will be scored by the power that combines the excellent protection of the turret with the rapid firing, hitherto a speciality of the casemate.

Trials of the Suffren's turrets by attack with 12-in. shot

Doubts having been frequently expressed as to whether a turret plated with modern hard-faced armour would successfully withstand the shock of impact of a heavy projectile without injury to the machinery, and especially to the training gear, trials on a large scale were carried out in France, the Massena firing two 12-in. shot at one of the main turrets of the Suffren. The velocity of impact was said to be about 1800 f.s., corresponding to a striking energy of some 15,000 ft. The target plate was bolted on outside the turret. One round was fired direct, and the other obliquely. The turret came out of the trial triumphantly, as indeed might have been expected from previous experience. It has been objected that the target-plate was too soft, and that it unduly added to the mass of the turret. As to the latter, the addition in weight was only some 1½ per cent., and though the plate was somewhat soft other experiments have shown that this would not greatly affect the result. Trials of gun shields for both the 4·7-in. and 6-in. guns in this country and in America have shown that a structure not weighing more than 9 to 12 tons, or say one-thirtieth of the Suffren's turret, may be hit by a projectile with one-eighth the energy of that fired at the Suffren without upsetting the training arrangements. A trial has also been carried out by firing at one of the turrets for a 6·4-in. French Q.F. The results have not been published, but there is no reason to anticipate anything but a satisfactory result. The French system of carrying most of the weight of the turret on a central pivot is undoubtedly more liable to disarrangement than the roller ring system, but both types are thoroughly efficient, and will stand all the hammering that they are likely to get.

Progress in propellants.

There is probably no ship afloat that still uses black or brown gunpowder, except as a bursting charge for shells, and the time is not far distant when this function also will be usurped by one or other of the high explosives which are now being used, to a limited extent, in all countries. The propellants in general use for guns may be divided into three classes:—

Class (*a*). A combination of nitro-glycerine and nitro-cellulose, with a high percentage of nitro-glycerine.—Type cordite.

Class (*b*). A combination of nitro-glycerine and nitro-cellulose, with a low percentage of nitro-glycerine.—Type cordite, M. D.

Class (*c*). Pure nitro-cellulose.—Type U.S. Navy Smokeless powder.

Hitherto, Great Britain, Germany and Italy, Japan and the Scandinavian powers have used Class (*a*). France is supposed to have used Class (*b*) at one time, but is now using Class (*c*), in which she is followed by Russia and the United States. None of the Powers seem quite satisfied with the smokeless powder first adopted; thus Great Britain has now definitely decided to abandon cordite in favour of cordite M.D. France is said to be inclining towards a nitro-glycerine powder, whilst in Germany, on the other hand, private makers have made great progress with the (*c*) type of propellant, which, it is said, may be adopted by the government. Italy and Russia seem to be fairly content at present, but very little is known as to what they are doing. The United States has made no secret of their difficulties with their (*c*) type. To begin with, this class of propellant is very expensive: it is at best twice as costly, charge for charge, as cordite. Its greatest and most serious defect is its lack of regularity. Some figures were given last year which showed that with similar charges widely different results were obtained, from which wild shooting must result. In order to obviate this serious defect, the following steps have been taken in America: —(1) The terms of the specification have been narrowed. (2) Great attention is devoted to blending. (3) Great care is devoted to making the cases air-tight, and every precaution is taken to prevent evaporation of volatile constituents. (4) The magazines are artificially cooled. (5) A system of index numbers has been arranged, so that the user of a high lot of powder will know by the high index number that the gun will shoot high with that particular lot, and *vice versâ.* Notwithstanding these precautions, some unpleasantly high pressures have been experienced, and in one ship at any rate, the Olympia, a considerable amount of powder was condemned and thrown overboard. It is also rumoured that besides the reduction of the charges of old-type guns, which were undoubtedly being overstrained in order to get increased power (for which the guns were not designed), there has also in the States been a reduction of the charges recommended for new-type guns. Germany's hesitation with regard to the adoption of a (*c*) type powder may be due to similar experience. That the German nitro-cellulose powder gives very high ballistics there can be no doubt, and the notable performances claimed for the Krupp guns by the manufacturer must be in great measure due to the excellence of the propellant from the ballistic point of view. But high velocity without regularity is fatal to the efficiency of long range firing, and as the gyroscopically guided torpedo forces ships to longer ranges, the importance of regularity in the powder is enhanced. The German

guns are the shortest and lightest made, and I should extremely doubt if the high velocities claimed for them will be realised on service.

At home cordite has proved very satisfactory as regards stability and regularity, but it causes excessive erosion, and the velocity obtainable falls short by 100–200 f.s. of that given by milder propellants. A modified cordite (M.D.) has therefore been adopted which is said to give very good ballistics without the defects of the (*c*) type powders. It will, however, be years hence before the earlier mark of cordite disappears from the service. It took ten years to supplant brown powder, and up till two years ago some first-class battleships had not had any smokeless powder issued for their heavy guns. Moreover, many of the old-type guns were not built for the high forward pressures of the slower M.D. cordite. Thus the majority of our ships will use ordinary cordite for many years to come. The newer ships will profit by the change, and it is probable that the new propellant will also take the place of cordite in the more important ships with 40-cal. guns. As pointed out last year, the 6-in. Q.F. would be greatly improved by the use of an increased charge in a larger chamber, and M.D. may be introduced for this gun, so as to increase the velocity from 2150 to 2400 f.s. or over. Of all the nitrous propellants cordite makes the least smoke, so that a change of propellant is likely to increase the amount of smoke appreciably. What with the smoke from guns, water-tube boilers, and bursting shells, it will still be very difficult to see clearly in a naval action.

Bursting charges for shells

In all countries a certain proportion of shells are now filled with high explosive. France took the lead by issuing melinite shells more than 10 years ago, whilst the United States brought up the rear, so that in their war with Spain in 1898 not a single high explosive shell was fired. But although it is admitted on all hands that the high explosive shell is far the most formidable projectile where the target is not protected by armour more than $\frac{1}{3}$ calibre thick, large numbers of common shells filled with powder are still issued. The reasons are not very clear, but the following may be cited as having some influence:—

(*a*) The greater risk to the gun when using high explosive, as a faulty fuse or defective shell may cause a premature which will burst the gun, whilst with a powder filled shell no harm would accrue if the shell does burst in the gun.

(*b*) The superior penetration of a powder-filled common shell.

Neither of these reasons can be accepted as sound. The ex-

perience at the Cape showed that with regard to (*a*) when using well-made shells and efficient fuses the risk is very small. As to (*b*) although a 9·2-in. common shell filled with powder might pierce a 5-in. plate, whilst a lyddite shell would be hardly equal to piercing more than 4 in., both of these projectiles would be much less effective for attacking men or *matériel* behind such plates than armour piercing shell. Apart from gun shields there are hardly any thinner plates than 3½ in. in any ship. Thin, unbacked plates such as gun shields, are more vulnerable to high explosive than to common shell. The ordinary side plating of 1 in. or less is an ideal target for the high explosive. The following shows roughly how the case stands for 6-in., 9·2-in., and 12-in. guns:—

Best projectile to use against plates as under:—

H = High explosive.
C = Common.
A = Armour piercing.

Plate.	6-inch Guns.	9·2-inch Guns.	12-inch Guns.
0 inch to 1 inch	H	H	H
1 ,, to 2 ,, ...	H	H	H
2 ,, to 3 ,, ...	H or C	H	H
3 ,, to 4 ,, ...	A	H or C	H
4 ,, to 5 ,, ...	A	A	H or C
5 ,, to 6 ,, ...	..	A	C or A
6 ,, to 7 ,, ...	..	A up to thickest plate penetrable	A up to thickest plate penetrable

Briefly, the high explosive shell does best against thin plating and the armour piercer against thick, and there is very small scope indeed for the common shell, which is only superior when the high explosive shell is beginning to fail and the plates are hardly thick enough to profitably employ the armour piercer. The question of the best explosive for use with armour-piercing shell is a difficult one, and no general solution has been arrived at. If a high explosive be used there is, first, the risk of reducing the penetration by a too early burst, and, second, the liability for the shell to burst in the gun through some defect in the base fuse. Base fuses must be used for armour piercers, and they are more liable to cause prematures than nose fuses. The Americans have had a premature burst destroying a 12-in. mortar with what is believed to have been a base fused high explosive shell, and the French also burst a 12-in. gun with apparently something of the same kind. For the present, therefore,

powder will probably be adhered to for armour-piercing shell, and the projectiles in general use will be:—

Nose Fused (thin walled) Shell filled high explosive,
Base Fused Armour-Piercing Shell filled powder,

whilst the powder-filled common shell, whether pointed or otherwise, will disappear. The armour-piercing shell will be used whenever the armour is readily penetrable. Otherwise the high explosive shell should be used to destroy unarmoured portions of the ship, and in the hope of getting one or two into the ports of guns shielded by impenetrable armour.

Armour plates and projectiles.

The trials of armour plates which have taken place at home during the year have not been interesting, consisting as they have done of the ordinary proof tests in which an uncapped shot is pitted against a plate which is more than a match for it. Hitherto, although capped armour-piercing projectiles have been adopted by all the Powers, they have not been used by us for the proof of plates. This is by no means reasonable, and the time cannot be far distant when plates will be proved by the same type of projectile that they will have to withstand in action.

Admiral O'Neil's explanatory statements with reference to the estimates for the United States Bureau of Ordnance are always interesting. He gives authentic confirmation to the report that there has been a great improvement in armour-piercing projectiles in the United States. The Firth Sterling Steel Company has developed a new type of shell with capacity for a relatively large bursting charge. The test for this type of shell is that it passes unbroken through a plate of hard-faced armour one calibre in thickness. This is a great advance on anything hitherto achieved, and assuming the velocity to be about the ordinary standard of 2000 f.s., it means that the penetration of these new projectiles is some 15 per cent. greater than that of those hitherto used. The discovery of this new material, or new process, will decrease the value of armour considerably, and greatly enhance the power of the big gun. It does not seem likely that the 6-in. gun can ever become an armour-piercer as against 6-in. plates, because at 3000 yards the velocity falls to 1900 f.s. in even the latest type of gun with the heaviest charge; but the 7·5-in. and 9·2-in. guns become much more formidable, and the 12-in. almost irresistible. The shells are capped, and as the cap loses much of its efficacy on oblique impact the best defence against them will be the sloping of the armour wherever possible. The Americans already slope the front plates of their turrets or gun hoods considerably, and all nations have adopted the sloping armoured deck to support the

belt. If this deck be thickened the capped shell may be kept out of the engine and boiler rooms. The upper strake of the belt and the plating of the bows and stern will be readily pierced, and the only remedy will be to plug all holes of whatever shape, for the holes will not be large. It is essential that the crew be kept behind the thick armour or beneath the armour deck whence they can issue to plug holes or put out fires, returning to their shelter when the work is done. In the action off Chemulpo, in which the Variag lost so heavily, the men below the armour deck were untouched. The new type of shell does not apparently possess any particular advantage when the obliquity of impact is very considerable, so that the protection given by armour decks is not much impaired. No information is to hand as to whether similar projectiles are being introduced elsewhere than in the United States, but, as was the case with the Harvey and Krupp processes of improving armour, it is practically certain that all nations will presently adopt the new shells. It is far easier to supply a gun with new projectile than to make any other change, for none of the fittings are seriously affected as is the case when an increased charge increases the strain on the mounting, and gives trouble with reference to the loading arrangements. The next few years will see considerable changes in the projectile supply, the new type armour-piercing shell superseding armour-piercing shot, and high explosive shell taking the place of common.

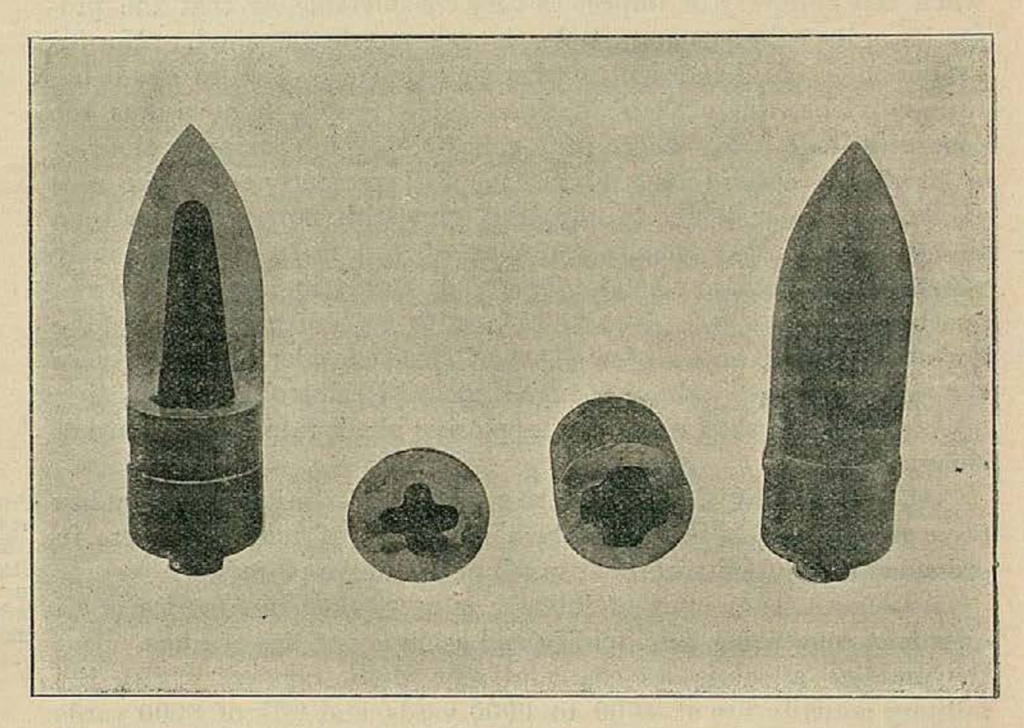
Progress in the United States in ordnance and gunnery.

At the moment of going to press a most interesting summary has been received from the Bethlehem Steel Co. of recent progress in ordnance in the United States, much of which we reproduce.

An enormous amount of interest is now taken in America in all questions concerning the rapidity and accuracy of fire of guns. But the practice afloat is at comparatively short ranges, whilst the military actually fire at 4000 to 6000 yards, and talk of 8000 yards as a fighting range. They use range-finding instruments with long horizontal bases which enable them to make good practice at targets moving at about 8 knots. Afloat, the Barr Stroud rangefinder is mainly used, but 4000 yards is said to be about the high limit of its effective use. A good deal of attention is being devoted to range-finding, and improved instruments will doubtless be devised for use in the Navy. The highest rate of fire attained afloat is about as follows:—12-in. and 13-in., one round per minute; 8-in., two rounds per minute; 6-in., ten to eleven rounds per minute. All this at short range with the distance known. It is not suggested that this rate is an average one, or that it could be maintained under fighting conditions, but it shows what is possible. The percentage of hits rose to

80 and 90 with the best guns, and the rate of hitting has gone up enormously. There is a decided disposition to favour the installation of secondary guns in turrets, as opposed to the pedestal mounting in broadside batteries. On the other hand there is a strong feeling against shields which are said to act as mere bursting screens for fair-sized projectiles. The explanation appears to be that shields are usually thin whilst turrets are thicker, and it is really the thin plate that is objected to and not the shield form. There is great activity of thought, effort, and design in so arranging the mounting that the guns and sights can be rapidly handled and accurately laid. It is

Mountings.



BETHLEHEM 3-INCH RIBBED PROJECTILE.

found best to so arrange the wheels for moving the guns and sights that several men can share the duties of handling them without interfering with one another. This gives a great advantage over the former system of putting everything in the hands of one man.

Projectiles and armour plates.

Progress is being made in enlarging the capacity of shells of all kinds; but owing to certain accidents with shells filled with high explosives, powder bursters are generally adhered to. In order to enlarge the capacity of armour-piercing shell without weakening the projectile the Bethlehem Company have introduced a shell with ribbed interior, a photograph of which is given. The capped

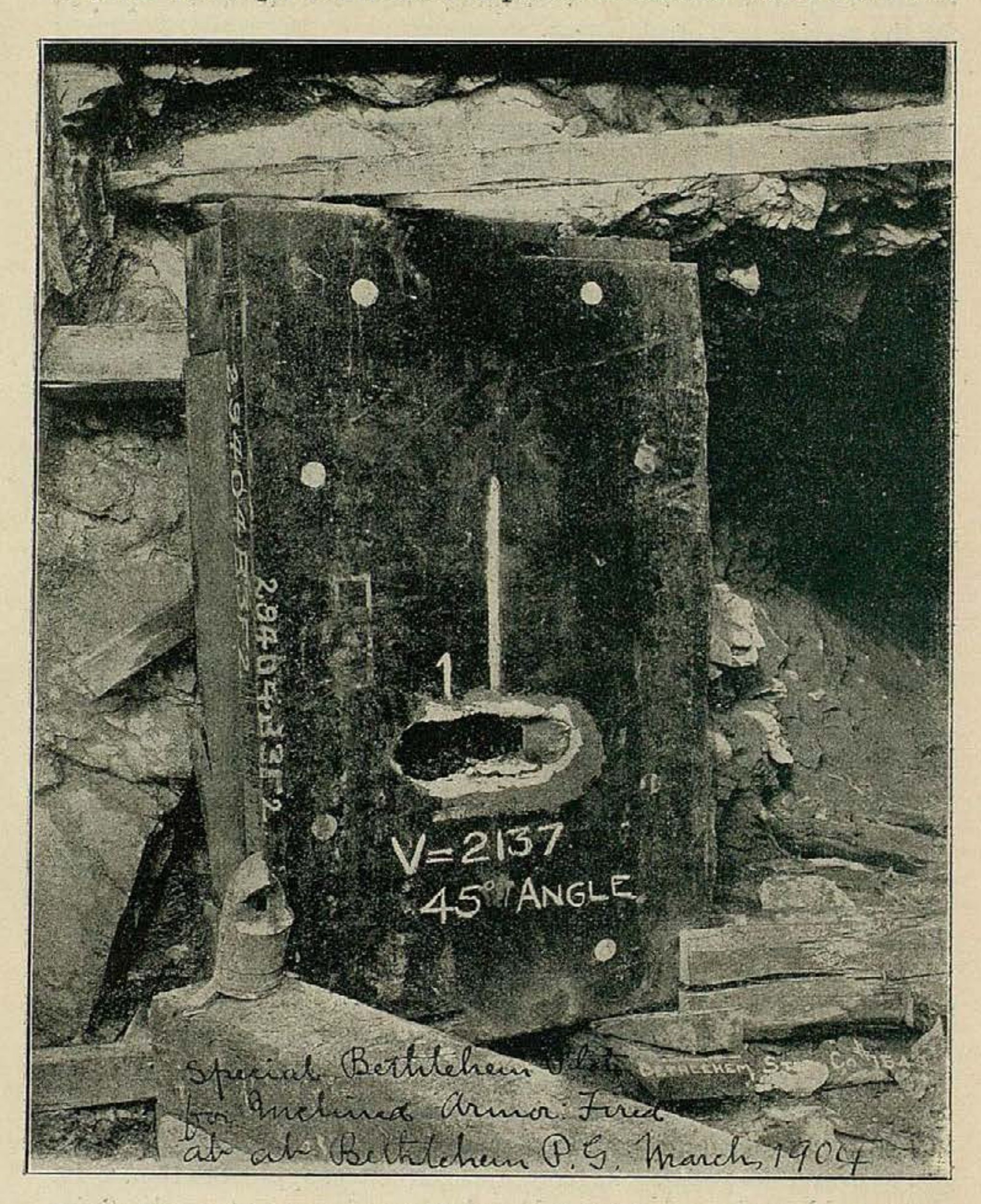
projectile, is used for all armour-plate tests. It is not considered that it loses its efficacy at low velocities, in fact, the following reports of trials show what very low striking velocities are now employed for the service test of plates :—

TESTS OF BETHLEHEM PLATES BY CAPPED PROJECTILES.

Plate.		Gun.	Projectile with Cap. Weight.	Mean Striking Velocity.	By Tresidder's Formula.		Remarks.
Nature.	Thickness.				Penetration. Wrought Iron.	Figure of Merit.	
	inches.		lb.	f.s.	inches.		
Harveyized casemate for St. Louis	4·0	4-in.	33	1418	5·8	1·45	3 Midvale shot. All broke on face. Penetration less than 1 in.
Nickel steel casemate for Pennsylvania .	5·0	5-in.	50	1558	7·4	1·48	2 Midvale, 1 Carpenter shot. All broke on face. Penetration, 1·7 in.
Krupp steel barbette of Nebraska .	7·5	8-in.	257	1584	13·7	1·83	1 Wheeler-Sterling, 1 Carpenter shot. Both broke on face. Penetration, 1·8 in.

In every instance the plate passed the test. The low figure of merit required as compared with that attained by plates of three years ago, which were only assailed by uncapped shot, is most notable. Thus the standard test for British 4-in. and 6-in. plates in 1901 was that they should have a figure of merit of 1·9 and 2·25 respectively. The resisting power has declined 20 to 25 per cent. It is not that the plates are inferior, but the capped projectiles are better. Whatever the reason for the decline, there is no doubt of the fact that the plates will give much less protection than was expected when the ships were designed. The St. Louis is not likely to be seriously attacked by a smaller gun than the 6-in. Even the low-velocity British 6-in. Q.F. will pierce her 4-in. plates at 3000 yards; and a high-velocity up-to-date gun at about 5000. The 5-in. plates cannot be relied on to keep out 6-in. shell from new-type guns inside 3500 yards, and would be easily beaten by the French 6·5-in. gun at over 4000 yards. Three years ago the test applied to the 7·5-in. plate would not have been considered severe for a plate only 6 in. thick. There are, in fact, several instances of 6-in. plates which have resisted shot with a penetrating power of 15 to 16-in. wrought iron. This 7·5-in. plate was only called upon to stand against a penetrating power of 13·7–ins.

The trials do not in themselves show that capped shot are effective at such low velocities, but it is not to be supposed that the experts who supervise the test of plates in America would have used



6-INCH CAPPED SHOT PENETRATES 4½-INCH HARD-FACED PLATE AT ANGLE OF 45°.

capped shot at the velocities recorded unless they were thoroughly convinced of their efficacy. We have, besides, the dictum of that high authority, Mr. Meigs of the Bethlehem Company, who states

positively that capped shot are efficient at low velocities. Mr. Meigs also somewhat upsets our previous ideas as to the inefficiency of capped shot for oblique impact by forwarding an account of a trial of a capped 6-in. shot against a hard-faced plate at an angle of 45°, in which the shot did very good work.

ATTACK OF INCLINED PLATE AT BETHLEHEM, MARCH, 1904.

Plate.		Gun.	Projectile with Cap. Weight.	Striking Velocity.		By Tresidder's Formula.		Remarks.
Nature.	Thickness.			Actual.	Resolved Normal to Plate.	Penetration. Wrought Iron.	Figure of Merit.	
	inches.		lb.	f.s.	f.s.	inches.		
Special Bethlehem for inclined armour	4·5	6-in.	100	2137	1511	9·0	2·0	Piece of plate punched out. The shot broke, and remained in front. (*See* photo.)

This result is said to be fairly representative of other trials. If this is so we must admit that the improvement of the metal of the projectiles has extended the usefulness of the cap. In any case the projectile is gaining rapidly on the plate, and it will be necessary to increase the thickness of the armour.

BRITISH RIFLED ORDNANCE.

Ordnance.										Charge (cordite).		Projectile.						Ballistics (with full charges).					
Calibre or Pr.	Nature. Weight.	Nature. Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber. Diameter (at largest).	Chamber. Length to base of projectile.	Rifling. Twist one turn in Least at breech.	Rifling. Twist one turn in Greatest at muzzle.	System.†	Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	Perforation of wrought iron. At muzzle.	Perforation of wrought iron. At 1000 yards range.	Perforation of wrought iron. At 2000 yards range.	Perforation of wrought iron. At 3000 yards.	Perforation Krupp steel, 3000 yards. Uncapped Shot.
B.L. GUNS.				cals.	ins.	ins.	cals.	cals.		lbs. oz.		ins.	lbs.	lbs. oz.			f. s.	ft. tons.	ins.	ins.	ins.	ins.	ins.
16·25-in.	110½ tons.	I. II. & III.	524·0	30·0	21·125	84·5	newer patterns.	30	Modified Pl. Section, the last in the new guns.	960‡ S.B.C.	..	16·25	1800	‡‡193 **179¼	0·147	0·420	2087	54,390	38·0	34·6	31·7	29·4	13
13·5-in.	69 & 67 tons.	I. II. III. & IV.	433·0	30·0	18·0	66·5		30		187 8	..	13·5	1250	**85	0·146	0·508	2016	35,230	33·0	30·2	27·6	25·2	11
12-in.	45 & 46 tons.	III. IV. V. & V.w	328·5	25·25	16·0	48·0		35		88 8	30	12·0	714	$31\frac{13}{16}$ ‡‡95 **79	0·202	0·413	1914	18,130	24·4	21·5	18·9	16·1	6
12-in.	46 tons.	VIII. Wire	445·5	35·43	16·0	70·0		30		167 8	50	12·0	850	$80–1\frac{9}{11}$	0·169	0·492	2367	33,020	37·0	32·7	29·4	26·6	11½
12-in.	50 tons.	IX. Wire	496·5	40·0	17.5	87·2		..		201 8 9 8	50 3¾	12·0	850	„	..	..	2481 §2750	36,290 44,622	39·7 46·0	35·4 41·2	31·6 37·3	28·7 34·0	12½ 15½
10-in.	31 tons.	Triumph & Swiftsure	483·0	45·0	14·0	64·5		..		..	..	10·0	500	..	..	..	§2800	§27,205	39·5	34·6	30·2	27·0	11½
10-in.	29 tons.	II. III. III.A & IV.	342·4	32·0	14·0	54·0		30		76 0	30	10·0	500	37¾	0·200	0·500	2040	14,430	24·8	21·8	19·3	17·0	6¾
9·2-in.	21 & 22 tons.	I. & II.	255·8	25·56	11·0	44·0		35		42 0	30	9·2	380	18 ‡‡33 $**30\frac{6}{16}$	0·223	0·488	1781	8,356	18·3	15·9	14·4	12·4	5¼
9·2-in.	24 & 22 tons.	III. V. VI. VI.A&c & VII.	310·0	31·5	12·0	43·0		30		53 8	30	9·2	380		0·223	0·488	2065	10,910	22·9	19·8	17·2	15·5	6
9·2-in.	25 tons.	Wire VIII.	384·0	40·08	10·5	53·15		..		63 0	40	9·2	380	..	0·223	0·488	2317	14,520	27·6	23·9	20·7	18·0	7¼

Calibre or Pr.	Weight.	Mark and Service.*	Total length in inches.	Length of Bore, including Chamber.	Chamber Diameter (at largest).	Length to base of projectile.	Least at breech.	Greatest at muzzle.	System.†	Charge Weight.	Size.	Diameter.	Weight.	Bursting Charge of Common Shell.	Value of $\frac{d^2}{w}$.	Value of $\frac{w}{d^3}$.	Muzzle velocity.	Total muzzle energy.	At muzzle.	At 1000 yards range.	At 2000 yards range.	At 3000 yards.	Perforation Krupp steel, 3000 yards. Uncapped Shot.
9·2-in.	27 tons.	Wire IX.	445·25	46·74	13·0	71·215	Various in the	..	P. Elswick, Hook, or	103 0	44	9·2	380	..	0·223	0·488	2640 §2800	18,400 20,685	33·3 36·0	28·9 31·2	25·0 27·4	22·0 24·0	9 10
8-in.	14 tons.	III.	222·5	25·1	10·5	34·5		35		28 12	20	8·0	210	$13\frac{10}{16}$ ‡‡29 ‡‡18½	0·305	0·410	1953	5,554	16·8	13·8	9·5	8·0	3½
8-in. 8-in.	15 tons. 14 tons.	IV. VI.	254·5	29·61	10·5	38		35 30		32 10	20	8·0	210		0·305	0·410	2150 2200	6,730 7,046	19·3 20·0	16·0 16·6	13·2 13·7	10·8 11·3	4½ 4¾
7·5-in.	16 tons.	Triumph & Swiftsure	386·7	50·0	..	46		..		..	..	..	200	..	0·281	0·474	§2800	10,883	29·0	24·9	21·4	17·8	7
7·5-in.	14 tons.	..	337·5	45	11·1	55		30		47 0 2 8	30 2½	7·5	200	18½	0·281	0·474	2600	9,340	26·0	22·3	18·8	15·7	6
6-in.	5 tons.	III.	170·7	25·53	8·0	26·75		35		14 12	20	6·0	100	$7\frac{4}{16}$ $**9\frac{13}{16}$	0·360	0·463	1960	2,665	13·4	10·7	8·9	7·0	3
6-in.	5 tons.	IV. VI.	173·5	26·0	8·0	26·75		35 30				6·0											
6-in.	7·4 tons.	VII. VIII.	269·5	45	8·5	32·7		30		20 0	20	6·0	100	9	0·360	0·463	2535 §2750	4,453 5,250	19·8 22·3	16·2 18·0	13·0 14·6	10·4 11·6	4½ 4¾
5-in.	38 cwt. 40 cwt.	II. III. IV. & V.	139·15	25·07 25·0	5·75	19·05		25		4 7¼	7·5	5·0	50	$7\frac{12}{16}$ $3\frac{5}{16}$	0·500	0·400	1750	1,062	8·8	6·6	5·3	4·1	..
4-in.	23 cwt. 26 cwt.	II. IIP. III. IIIA. IV. V. & VI.	120·0	27·0	5·3	18·5	120	30		3 1	5	4·0	25	$1\frac{12}{16}$ $3\frac{3}{16}$	0·640	0·391	1900	625	7·7	5·4	4·0	3·0	..

* The Roman numeral is the number of the pattern given. Further differences in pattern are indicated by letters a, b, and c.

† P. means Polygroove; Pl., Plain; ‡ Cordite has not been introduced for this gun; § Estimated with M.D. Cordite; ‖ Shrapnel; ** Cast steel; ‡‡ Forged steel.

BRITISH RIFLED ORDNANCE—*continued.*

Ordnance. Nature. Calibre or Pr.	Ordnance. Nature. Weight.	Ordnance. Nature. Mark and Service.	Ordnance. Total length in inches.	Ordnance. Length of Bore, including Chamber.	Ordnance. Chamber. Diameter.	Ordnance. Chamber. Length to base of projectile.	Ordnance. Rifling. Twist one turn in Least at breech.	Ordnance. Rifling. Twist one turn in Greatest at muzzle.	Ordnance. Rifling. System.*	Charge (full). Weight.	Charge (cordite). Weight.	Charge (cordite). Size.	Projectile. Diameter.	Projectile. Weight.	Projectile. Bursting Charge of Common Shell.	Projectile. Value of $\frac{d^2}{w}$.	Projectile. Value of $\frac{w}{d^3}$.	Projectile. Muzzle velocity.	Ballistics (with full charges). Total muzzle energy.	Ballistics. Muzzle energy per ton of gun.	Ballistics. Perforation of wrought iron. At muzzle.	Ballistics. Perforation of wrought iron. At 1000 yards range.	Ballistics. Perforation of wrought iron. At 2000 yards range.	Ballistics. Perforation of wrought iron. At 3000 yards range.
QUICK-FIRING GUNS (using metal cases)				cals.	ins.	ins.	cals.	cals.		lbs.	lbs. ozs.		ins.	lbs.	lbs.			f. s.	ft. tons.	ft. tons.	ins.	ins.	ins.	ins.
6·0 in.	7 tons	I. & III. II. (Wire)	249·25	40	..	..	60	30	P.	..	13 4	30	6·0	100·0	..	0·360	0·463	2200	3356	479	15·9	12·7	10·2	8·2
6·0 in. Q.F.C.	5 "	I. to VI.	169·1	26·2	..	..	..	..										1913	2537	362	13·0	10·3	8·2	6·4
			166·6	26·6	..	..	..	..																
4·7 in.	41 cwt. 42 "	I. II. III. & IV. Wire	194·1	40	..	..	100 0	34·4 30	E.O.C.	..	5 7	20	4·72	45·0	..	0·495	0·428	2188	1494	711	12·4	9·2	6·6	5·0
4 in.	26 cwt.	I. II. III. Wire	165·25	40	..	..	..	30	M.Pl.	..	3 9	15	..	25 0	..	0·640	0·390	2300	917	705	10·5	6·9	4·9	3·3
		converted guns	120	28														2177	821	569	9·5	6·5	4·6	3·0
12-pr.	12 cwt.	I.	123·6	40	..	..	120 0	28 30	E.O.C. M.Pl.	..	1 15	10	3·0	12·5	..	0·667	0·500	2210	423	677	8·1	5·3	3·5	2·4
12-pr.	8 cwt.	I.	87·6	28	..	..	60 0	28 30	E.O.C. M.Pl.	..	13¾	10	3·0	12·5	..	0·667	0·500	1607	223·8	544	4·9	3·2	2·4	..
Hotchkiss . 6-pr...	8 cwt.	I. & II.	97·63	40·0	..	..	180	29·9	M.Pl.	..	b7¾	5	2·24	6·0	..	0·836	0·534	1818	137·5	344·8	4·8	2·8	..	..
Nordenfelt . 6-pr...	6 cwt.	I. II. & III.	104·4	42·3	..	..																		
Hotchkiss . 3-pr...	5 cwt.	I. & II.	80·63	40	..	..	25	25	M.Pl.	..	b6⅜	5	1·85	3·3	..	1·037	0·521	1873	80·3	321·2	4·1	2·1	..	..
Nordenfelt . 3-pr...	4 cwt.	I. L.	91·5	45·4									..	..	..	..	..	1920	84·3	337·2	4·3	2·2	..	..
MACHINE GUNS.										grains.				oz. grs.										
Nordenfelt, 2 bar 1-in.	180 lbs.	I.	52		..	..	35	35	H.	625 M.G.	..	..	1·0	7¼ 0	..	2·207	0·453	..	..	..	¼-in. at 200 yards.			
" 4 bar 1-in.	447 lbs.	III.†	57·0		..	..	35	35	H.															
" 5 bar 0·45-in.	160 lbs.	I. G. G.	46·0		..	..	22	22	H.															
	143 lbs.	II. G. G.	42·25		..	..	22	22	H.															
Gardner, 1 bar 0·45-in.	76 lbs.	I. G. G.	47·0		..	..	22	22	H.	85 R.F.G$_2$.	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle, which perforates ⅛ in. wrought iron plate at 600 yds., $\frac{3}{16}$ in. at 400 yds., ¼ in. at 100 yds.			
" 2 bar 0·45-in.	120 lbs.	I. G. G.	47·0		..	..	22	22	H.															
" 5 bar 0·45 in	268 lbs.	I. G. G.	53·5		..	..	22	22	H.															
Maxim, 1 bar 0·45 in.	63 lbs.	I. G. G.	43·75		..	..	22	22	H.	31 Cordite	..	..	0·450	480	..	2·952	0·751	..	..	..	Same as M.H. Rifle.			
			45·0				10	27	Enf'ld															
Maxim, ·303			42·38				10	25·6	Metf'd				0·303	215	..	..	..	..	..	..	Same as Lee-Metford.			

* P. means Polygroove; M.Pl., Modified plain; W., Woolwich; F., French; F.M., French modified; H., Henry.

† I. and II. differ chiefly in being 7 lbs. lighter; I. has a pitch of rifling of 1 in 60 in.; G.G., Gardner Gatling; H., Henry. b With 4 grs. R.F.G. § This gun has no metal cartridge.

Note.—An armour-piercing shell has now come in for the 6-in. guns.

AUSTRIAN NAVAL ORDNANCE.

Designation by Calibre, in centimètres	30·5 L. 35 C. 80	24 cm. L. 40 C. 101	24 cm. L. 40 C. 94	24 L. 35 C. 86	19 L. 42 Skoda.	15 L. 40 C. 101	15 L. 40 C. 94	15 L. 35 C. 86	15 L. 35 C. 80	12 L. 40	12 L. 35 C. 80	12 L. 35 C. 87
	Krupp Steel B.L. & Q.F. Guns.											
Calibre, in inches	12·01	9·45	9·45	9·45	7·5	5·91	5·87	5·87	5·87	4·72	4·72	4·72
Length: Total, in feet	35·11	31·6	..	27·60	26·3	19·5	..	17·13	17·13	..	13·8	13·8
Length: Rifled Portion, in ins.	314·8	..	..	237·7	..	..	..	151·4	153·6	..	128·5	126·3
Length: Powder Chamber in ins.	69·9	..	..	65·2	..	..	..	37·3	35·4	..	24·0	26·3
Length: Of bore in calibres	35	37·2	37·4	35	40	37·2	37·0	35	35·0	37	35·0	35
No. of Grooves	68	..	..	25	..	..	..	36	36	..	32	32
Twist in calibres	45·25	..	..	26·9	..	..	..	45–25	25	..	25	25
Weight: Gun, tons	47·2	21·5	27·8	26·6	11·6	5·18	4·39	5·7	4·69	1·97	2·25	2·31
Weight: Breech Block, in lbs.	3306·9	..	..	1776·9	..	..	..	445·3	463·0	..	253·5	211·6
Weight: Steel Shell "	1003·1	474	474	474·0	198	112·5	100	112·5	86·0	52·4	57·3	57·3
Weight: Common Shell "	1003·1	474	474	474·0	..	112·5	100	112·5	69·9	52·4	57·3	57·3
Weight: Shrapnel Shell "	..	..	..	..	..	..	..	112·4	71·9	..	57·3	57·3
Weight of Bursting Charge: Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Steel Shell "	10·6	..	..	5·1	..	..	..	1·3	1·76	..	0·55	0·55
Weight of Bursting Charge: Common Shell "	97·7	..	..	17·9	..	..	..	5·29	3·86	..	2·2	2·2
Weight of Bursting Charge: Shrapnel Shell "	..	..	..	..	..	..	..	1·26	1·10	..	0·57	0·57
Weight of Firing Charge: Steel Projectile, in lbs.	156·5 24 cm.N	120·6	91·5	99·2N	56N	28·8	18·3	22·5 15 cm.N	38·8*	9·7	19·8 B	12·13N
Weight of Firing Charge: Common Shell, in lbs.	156·5 N 24 cm.N		91·5	99·2N			18·3	22·5 15 cm.N	38·8*		19·8 B	12·13N
Weight of Firing Charge: Shrapnel, in lbs.	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Firing Charge: Exercising, in lbs.	154·3B	..	..	..	..	..	..	28·7	19·6	..	11·0	6·6 N
Weight of Firing Charge: Saluting "	19·8 O	..	..	15·4O	..	..	..	4·74	4·74 O	..	2·4 O	2·4 O
Muzzle Velocity, in feet	1969	2595	2264	2100	2700	2608	2264	2133	1969	2264	1755	2133
Muzzle Energy: Total, foot-tons	26,970	22,121	16,845	14,500	10,025	5308	..	3549	2312	3554	1215	1808
Muzzle Energy: Per inch circumference, foot-tons	714·8	..	..	488·3	..	..	3554	192·5	125·4	..	82·5	122·2
Thickness of Iron, perforated inches at Muzzle, by Tresidder's formula	30·1	34·5	29·0	25·8	27·3	22·0	17·0	16·1	12·6	13·7	9·7	12·9
Perforation of Krupp Steel, 3000 yds., inches	10	9½	8	7	6¾	5	3½	3½	..	..	..	..

NOTE.—C for cube powder; * prismatic powder; O, ordinary powder; B, brown prismatic. N, nitro-glycerine smokeless powder.
† By Krupp's formula. ‡ By Fairbairn's formula.
There are also Q.F. Skoda 7-cm., Skoda and Hotchkiss 47-mm., another 47-mm. and Hotchkiss 37-mm.

DANISH NAVAL ORDNANCE.

	Krupp B.L. Guns designated.													
Designation by Calibre	35·5 cm.	30·5 cm.	26 cm. long.	26 cm. short.	24 cm.	24 cm.	21 cm.	15 cm.	15 cm. long.	15 cm. medium.	15 cm. short.	12 cm. long.	12 cm.	8·7 cm.
Calibre, in inches	13·98	12·01	10·24	10·24	9·4	9·4	8·24	5·9	5·91	5·91	5·91	4·72	4·7	3·43
Total length, in feet	29·1	22·0	32·8	18·77	31·4	31·6	24·04	..	17·1	12·63	10·7	11·8	..	11·5
Length of Bore, including Powder Chamber, in inches	304·7	227·2	327·6	194·5	..	..	264·5	..	190·3	135·0	112·9	128·8	..	..
Length of Bore, including Powder Chamber, in calibres	21·8	18·9	32·0	19·0	37	37·5	35	40	32·2	22·8	19·1	27·3	37·5	37·1
Number of Grooves	80	68	60	60	..	..	48	..	36	36	36	32	..	..
Twist of Rifling, in calibres	45	45	70–25	45	..	..	70–25	..	70–25	45	45	25	..	..
Total weight, including Breech-gear, tons	51·3	35·4	27·6	21·6	25·4	22·9	13·3	..	4·7	4·4	3·5	2·13	..	..
Weight of Breech Block, lbs.	4695·8	2910	2006	1940	..	..	903·9	..	390·2	330·7	324·1	229·2	..	..
Weight of Steel Shell, "	1157·4	725·3	451·9	451·9	353	353	238·1	112	112·4	..	86·0	..	44	..
Weight of Chilled Shell, "	1157·4	725·3	..	451·9	..	..	..	..	..	86·0	86·0	..	..	..
Weight of Common Shell, "	1157·4	725·3	451·9	451·9	230	353	238·1	112	112·4	69·4	69·4	57·3	44	20
Weight of Shrapnel Shell, "	1157·4	725·3	451·9	451·9	..	..	238·1	..	112·4	86·0	86·0	57·3	..	..
Weight of Case Shot, "	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Weight of Bursting Charge, Common Shell, "	57·3	39·7	25·4	25·4	16·5	16·5	12·8	6·2	6·2	3·0	3·0	1·7	..	..
Weight of Firing Charge, Steel or Chilled Shell, lbs.	330·7	180·2	191·8	101·4	..	75*	105·8	20·9*	41·9	19·3	21·8	17·4	9·7*	3·59*
Weight of Firing Charge, Common Shell, "	330·7	180·2	191·8	112·4	..	75*	105·8	..	41·9	19·3	21·8	17·4	..	..
Muzzle Velocity, Armour-piercing Projectile, feet	1762	1675	2018	1640	2159	2362	2021	2264	1800	1565	1542	..	2460	2379
Muzzle Velocity, Common Shell, "	1762	1675	2018	1640	..	..	2021	..	1890	1683	1690	1720	..	..
Muzzle Energy, Total foot-tons	24910	14110	12770	8428	11,440	13,656	6745	3981	2784	1461	1418	..	1846	780
Muzzle Energy, Per inch circumference, foot-tons	568·3	374·1	396·8	262·0	..	..	260·6	..	150·0	78·7	73·0	..	..	..
Perforation at Muzzle, wrought iron, Tresidder's formula	25·6	20·1	22·9	16·8	23·3	26·7	18·5	17·8	15·6	12·6	..	..	14·2	10·7
Perforation Krupp Steel, 3000 yards, inches	7	5½	6	4¾	6	7	5	3½	3	..	..	..	..	..

NOTE.—Chilled projectiles will gradually be replaced by steel. * Smokeless powder.

There is also a 44-calibre 5-pr. Hotchkiss, V. = 2362 f.s.

DUTCH NAVAL ORDNANCE.

	Krupp Breech Loading Q.F.											Dutch Breech Loading.
Designation by Calibre, in centimètres	28	24	21	21	21	No. 2.	15	15	12	12	12	12l
Calibre, in inches	11·0	9·4	7·91	8·2	8·2	5·87	5·9	5·9	4 7	4·7	4·72	4·72
Total Length, in feet	27·5	31·6	24·04	24·0	27·5	17·13	17·1	19·7	13 9	15·9	13·78	13·78
Length of Rifled Portion of Bore, in inches	..	..	222·2	..	..	151·4	..	..	..	..	128·5	..
Length of Powder Chamber "	..	..	42·4	..	..	37·7	..	..	..	..	24·0	..
Length of Bore, in Calibres	27	37	35	32	37·1	35	32	37	32·3	37·3	35	35
Number of Grooves	..	..	48/64	..	..	44	..	..	..	..	32	32
Depth of Grooves, inches	..	..	0·059	..	..	..	..	..	..	..	..	0·06
Twist of Rifling, in Calibres	..	..	∝ 25	..	..	25	..	..	..	..	25	∝ 45
Total Weight, in tons	27	25·3	12·79 / 13·98	14·0	16·2	4·72	3·8	4·7	1·9	2·7	2·26	2·31
Firing Charge — Armour-piercing Projectile, in lbs.	185	..	99·2	119	..	49·6	15·4	18·5	..	..	19·8	19·5
Firing Charge — Common Shell "	..	..	99·2	..	..	49·6	..	..	..	..	19·8	19·8
Weight — Armour-piercing Projectile "	761	474	308·6	309	309	112·2	100	88·2	52·4	57·4	57·3	57·3
Weight — Common Shell "	..	..	308·6	..	..	112·2	..	..	..	..	57·3	57·3
Weight — Case Shot "	..	..	..	..	..	..	..	..	..	..	57·3	..
Bursting Charge — Armour-piercing Projectile "	..	..	4·6	..	..	..	..	..	..	..	..	..
Bursting Charge — Common Shell "	20	..	12·3	..	..	..	..	..	..	..	..	..
Muzzle Velocity, feet	1627	2562	1739	1903	2067	2001	2034	2461	2034	2067	1755	1804
Muzzle Energy — Total, in foot-tons	13,960	21,589	6471	7760	9756	3115	2867	3703	1503	1689	1224	1264
Muzzle Energy — Per inch Circumference, foot-tons	..	..	260·7	..	..	169·0	..	..	..	..	82·5	85·2
Perforation at Muzzle, in inches	20·0	34·0	16·8 / 17·1	19·4	21·9	13·6 / 14·8	14·3	17·9	11·6	12·4	9·4 / 10·1	9·6
Perforation Krupp Steel, 3000 yards	5½	9½	3½	4½	5	..	..	..	..	..	..	..

Smokeless powder is used, but the weight of charge is not known.

FRENCH NAVAL ORDNANCE.

Date and Pattern of Gun.	Model 1902.	Model 1893–96.				Model 1893.				
Desig. by Calibre, in cms.	30·5	30·5	27·44	24·0	19·4	34·0	30·5	27·44	24·0	19·4
Calibre, in inches	12·01	12·01	10·8	9·45	7·64	13·39	12·0	10·8	9·45	7·64
Total length, in feet	..	..	..	..	..	..	..	..	..	..
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	..
Length of Bore, in cals.	45	45	45	40	40	35	40	45	40	40
Number of Grooves	..	..	..	..	..	..	..	..	..	..
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	..
Rifling Twist	..	..	..	..	..	..	..	..	..	..
Total weight, in tons	..	44·4	34·5	23·6	12·5	52·9	45·9	34·9	22·4	10·6
Weight of Firing Charge: Armour-piercing Projectile, lbs.	..	246	188·5	145½	74	243·0	198·4	114·6	110·2	44·1
Weight of Firing Charge: Com. Shell lbs.	..	..	..	..	..	..	..	..	..	..
Weight: Armour-piercing Projectile* lbs.	750	750	562	375	190	925·9	643·8	476·2	317·5	165·3
Weight: Com. Shell "	..	644	476	317	165	..	..	..	..	..
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..
Muzzle Velocity, in f.-s., A.P. Projectile	2870	2650	2650	2870	2870	2400	2625	2625	2625	2625
Muzzle Energy: Total, in f.-t.	42890	36782	27186	21445	10890	36850	30750	22750	15170	7898
Muzzle Energy: Per in. circ., f.-t.	..	..	..	..	..	..	815·8	670·7	511·1	329·1
Perforation at Muzzle† wrought iron, inches.	46·0	42·7	38·8	37·0	29·0	36·8	37·3	33·7	29·4	23·4
Perforation Krupp Steel 3,000 yds.	15½	13½	11½	10½	6¾	11½	11	9	7½	5½

Date and Pattern of Gun.	Model 1887.				1884.					1881.						
Desig. by Calibre, in cms.	34	30·5	27	19	34	27	24	16	14	34 long.	34 short.	27	24	16 heavy.	16 light.	14
Calibre, in inches	13·39	12·0	10·80	7·64	13·39	10·80	9·45	6·49	5·45	13·39	13·39	10·8	9·45	6·49	6·49	5·46
Total length, in feet	..	..	..	..	..	28·47	24·89	17·04	..	33·69	25·32	27·12	23·70	15·14	15·14	14·3
Length of Bore, in ins.	..	..	..	..	..	..	..	..	..	380·6	280·2	306·9	269·3	180·9	180·9	162·6
Length of Bore, in cals.	42	45	45	45	30	30	30	30	30	28·5	21·0	28·5	28·5	28	28	28
Number of Grooves	..	..	..	..	..	..	..	..	..	..	..	..	..	50	50	42
Depth of Grooves, inches	..	..	..	..	..	..	..	..	..	0·067	0·067	0·059	0·055	0·039	0·039	0·035
Rifling Twist	..	..	..	..	..	..	..	..	..	7°	7°	7°	7°	7°	7°	7°
Total weight, in tons	60·0	49·2	37·1	10·6	50·8	27·7	17·9	5·4	3·15	52·2	47·2	27·4	17·7	4·9	3·9	3·2
Weight of Firing Charge: Armour-piercing Projectile, lbs.	220·5	198·4	114·6	44·1	388·0	200·6	..	42·5	..	388·0	337·3	203·9	149·9	42·5	32·6	..
Weight of Firing Charge: Com. Shell lbs.	..	..	..	..	..	200·6	..	42·5	27·1	337·3	368·2	203·9	149·9	42·5	32·6	27·1
Weight: Armour-piercing Projectile* lbs.	925·9	643·8	476·2	165·3	925·9	476·2	317·5	99·2	..	925·9	925·9	476·2	317·5	99·2	99·2	..
Weight: Com. Shell "	..	..	..	..	771·6	396·8	264·6	99·2	66·1	771·6	771·6	396·8	264·6	99·2	99·2	66·1
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..	130·7	130·7	61·7
Muzzle Velocity, in f.-s., A.P. Projectile	2560	2625	2625	2625	1969	1969	1969	1969	1969	1969	1804	1969	1969	1969	1821	1936
Muzzle Energy: Total, in f.-t.	42040	30750	22750	7898	24900	12800	8539	2668	1777	24900	20880	12800	8539	2668	2080	..
Muzzle Energy: Per in. circ., f.-t.	..	815·8	670·7	329·1	591·9	377·5	287·7	130·8	103·9	591·9	496·6	377·5	287·7	130·9	121·3	..
Perforation at Muzzle† wrought iron, inches.	40·8	37·3	33·7	23·4	27·6	22·0	19·2	13·0	10·7	27·6	24·2	22·0	19·2	13·0	11·6	..
Perforation Krupp Steel 3,000 yds.	13	11	9	5½	7½	6	5¼	3	..	7½	7	6	5¼	3	..	..

* Steel or chilled iron. † By Tresidder's formula.

Some 50-calibre 24-cm. and 19·4-cm. are being made. The velocity will be about 3000 f.s.

FRENCH NAVAL ORDNANCE—*continued.*

Date and Pattern of Gun.	164·7.	Q.F. Guns. 164·7	16§	16‡	14§	14	Mod. 92. 10	Mod. 91. 10	Mod. 81. 10‡
Desig. by Calibre, in cms.	164·7		16·47		13·86			10·00	
Calibre, in inches	6·46		6·46		5·44			3·94	
Total length, in feet	26·9								
Length of Bore, in inches	..								
Length of Bore, in calibres	47·5	45	45	30	45	30	60	50	26
Number of Grooves	..								
Depth of Grooves, inches	..								
Rifling Twist	..								
Total weight, in tons	8·5*	8·1	6·89	4·92	4·13	3·84	2·19	1·62	1·18
Weight of Firing Charge: Armour-piercing Projectile * . . lbs.	..	44	30·2	19·0	16·1	12·8	8·16	8·16	5·07
Weight of Firing Charge: Common Shell . . ”	..								
Weight: Armour-piercing Projectile . . lbs.	115	115	99·21		66·14			30·87	
Weight: Common Shell . . ”	..								
Weight: Case Shot . . ”	..								
Muzzle Velocity, in ft.-secs.	3000*	2870	§2625	2100	2625	2100	2500	2428	1840
Muzzle Energy: Total, in foot-tons	7185	6568	4730	3061	3160	2022	1340	1266	725
Muzzle Energy: Per in. circ., foot-tons	..	..	233·5	150·9	184·9	118·7	..	..	..
Perforation at Muzzle, wrought iron, inches	26·3	24·5†	20·0†	14·4†	17·7†	12·7†	13·0†	12·5†	8·2†
Perforation Krupp steel, 3,000 yards	5¾	5¼	4	..	..	..	..	..	..

* Estimated. † By Tresidder's formula. ‡ Models 1881 and 1884 converted guns.

§ There are three models of the years 1887, 1891 and 1893, of slightly different weights from the above.

GERMAN NAVAL ORDNANCE.

Krupp Steel Breech-loading Guns, designated by calibre.

Designation in centimètres	30·5 jack'd.	28	28	26 long.	26 jack'd.	26 short.	24 Q.F.	24 long.	24 long.	21 Q.F.	17	15 Q.F.	15 Q.F.	10·5 Q.F.	10·5 Q.F.	12·5 hoop'd.	10·5 long.	8·8	6
Calibre, in inches	12·01	11·02	11·02	10·33	10·33	10·33	9·45	9·45	9·45	8·2	6·7	5·9	5·9	4·13	4·13	4·92	3·96	3·42	2·36
Length: Total, in feet	21·98	36·75	32·15	18·77	18·77	17·06	31·50	27·56	23·63	27·4	22·3	17·6	19·7	12·1	13·9	9·60	12·08	11·3	4·1
Length: Rifled portion, in ins.	181·9	407·9	352·8	149·8	150·0	129·3	349·6	302·4	201·6	..	..	..	..	..	..	85·7	113·6	..	44·3
Length: Powder Chamber ,,	45·3			44·7	44·4	44·7	..	..	53·5	..	..	..	..	..	..	16·7	19·5	..	..
Length: Bore, in calibres	18·9	40	35	18·8	18·8	16·8	37·4	32·0	26·1	37·0	37·7	32·2	37·0	32·2	37·2	20·8	33·6	37·2	..
Number of Grooves	72	..	..	36	48	36	..	..	56	..	..	..	..	..	..	32	32	..	24
Depth of Grooves, in inches	0·079	..	..	0·077	0·079	0·077	..	..	0·059	..	..	..	..	..	..	0·059	0·049	..	..
Twist, in calibres	45	..	..	50	50	50	..	..	25	..	..	..	..	..	..	40	25	..	..
Weight: Gun, including Breech Gear, tons	35·4	43·4	43·2	21·7	18·7	17·7	25·4	21·7	18·7	14·0	7·8	4·4	5·4	1·25	2·28	1·38	1·15	..	0·10
Weight: Breech Block, in lbs.	2954	..	..	2050	1973	1973	..	..	..	..	..	..	..	..	..	163·1	149·9	..	..
Weight: Armour-piercing projectile, in lbs.	725·3	562·2	562·2	412·3	412·3	412·3	474·0	474·0	474·0	309	..	88	88	40	40	..	..	2·18	..
Weight: Common Shell, in lbs.	725·3	595·0	474·0	357·1	357·1	357·1	474·0	474·0	474·0	309	154	..	..	..	..	40·1	39·7	..	6·61
Weight of Bursting Charge: Armour-piercing Shell, in lbs.	7·7	..	..	5·3	5·3	5·3	7·05	7·05	6·6	4·4	154	..	..	..	..	..	..	..	..
Weight of Bursting Charge: Common Shell, in lbs.	19·8	25·4	25·4	14·3	14·3	22·0	16·5	16·5	15·4	11·1	..	..	..	..	..	2·4	0·9	..	..
Weight of Firing Charge: Armour-piercing Shell, in lbs.	202·8	198·0§	297·6	105·8	105·8	125·7	89·3	152	152·1	60·2	..	13·5	18·7	4·8	..	..	..	..	..
Initial Velocity: Armour-piercing projectile, ft.-secs.	1713	2700§	2133	1588	1588	1578	2296	1803	1657	2360	44	2034	2560	2034	2349	..	..	2400§	..
Initial Velocity: Common shell, ft.-secs.	1713	..	..	1641	1641	1654	..	..	1657	..	2700	..	..	..	..	1545	1526	..	1545
Muzzle Energy: Total, foot-tons	14,750	30,000§	17,740	7211	7211	7119	17,330	10,683	9024	11,934	..	2525	4003	1119	1530	..	..	720	..
Muzzle Energy: Per in. circ., ft.-tons	391	..	512·4	223	223	220	..	401·2	304	..	7795	..	..	..	..	..	..	..	..
Perforation at Muzzle, by Tresidder's formula	20·8	39·0	26·7	15·1	15·1	15·0	29·7	20·7	18·0	26·7	25·5	13·4	19·0	10·8	13·3	..	..	10·0	..
Perforation Krupp Steel, 3000 yards, inches	5¾	11½	7¼	..	..	..	8½	5¾	5¼	6½	5¾	..	4	..	..	..	..	..	..

§ Estimated.

ITALIAN NAVAL ORDNANCE.

	Armstrong Breech Loading.					Q.F.	Armstrong B.L.	Armstrong Quick Firing.					
Designation by Calibre, in centimètres	43·1†	43·1† Early Pattern. 1882.	34·3	30·5	25·4	20·3	15·2	15·2	15·2	15·2	12·0	12·0	7·6
Calibre, in inches	17	17	13·5	12	10	8	6	6	6	6	4·7	4·7	3·0
Length: Total, in feet	40·75	39	36·09	..	34·8	..	16·9	17·0	20·9	20·9	16·2	13·0	..
Length: Rifled Bore, in inches	346·8	315·7	..	..	..	..	..	..	..	..	} 189	..	..
Length: Powder Chamber, in inches	84·5	98	..	..	..	..	..	..	..	..		..	..
Length: Bore, in Calibres	27	26	..	40	40	45	32	33·0	40	40	40	35	40
No. of Grooves	82	82	56	..	..	..	..	..	..	..	22	22	..
Twist of Rifling, in Calibres	50	50	..	..	..	..	..	..	..	..	34·4	..	..
Total Weight, in tons	104·3	101·5	67·9	..	30	..	5·4	5·1	5·7	6·5	2·05	1·69	0·6
Firing Charge: Armour-piercing projectile, lbs.	900·0	725	630·5	..	..	..	46	46	46	17·6*	..	..	..
Firing Charge: Common Shell, "	600	480	..	..	..	..	..	..	..	..	..	..	..
Weight: Armour-piercing projectile, "	2000	2000	1250	850	448	250	98	98	100	100	45·0	36·0	12
Weight: Common Shell, "	2000	2000	1250	..	..	..	..	..	..	..	..	36·2	..
Weight: Shrapnel " "	2017	2017	1250	..	..	..	..	..	..	..	..	29·8	..
Weight: Case Shot "	..	..	..	..	..	..	..	..	..	..	..	..	..
Bursting Charge: Armour-piercing projectile, "	32	32	17·4	..	..	..	2·0	2·0	5·1	4·4	..	1·83	..
Bursting Charge: Common Shell, "	60	60	87·1	..	..	..	..	..	..	..	..	3·02	..
Bursting Charge: Shrapnel " "	5	5	4·25	..	..	..	..	..	..	..	..	0·35	..
Muzzle Velocity, in ft.-secs.	1992	1935	2016	2500	2460	2600	1952	1985	2149	2297	2180	..	2625
Muzzle Energy: Total, foot-tons	55,030	51,930	35,230	36,925	18,798	11,730	2577	2705	3169	3622	1490	..	573
Muzzle Energy: Per inch circumference, foot-tons	1035	976·3	830·8	..	..	..	..	..	..	..	..	..	..
Perforation at Muzzle, inches of iron by Tresidder's formula	36·7	35·0	33·0	40·0	31·0	28·3	13·2	13·6	15·4	17·0	12·4	..	10·2
Perforation Krupp Steel, 3000 yds., inches	12½	12	11	13	9	7	..	..	..	3½	..	..	..

* Ballistite. † There are four types of these guns, viz.—Lauria, Lepanto, Italia, Morosini.

Note.—There is also a 6-inch quick-firing gun, 40 cals. M.V., 2600 f.s.

The weight of Ballistite charges is not known, but it is understood that they give the same ballistites as the powder charges shown.

RUSSIAN NAVAL ORDNANCE.

	Obukhoff Steel Breech Loading Hooped Guns.				Steel B.L. Guns.		
Designation by Calibre, in inches	12	9	8	6 Long.	4·2 9-pdr.	3·43 Long. 4-pdr.	3·43 4-pdr.
Calibre in centimètres	30·48	22·86	20·32	15·24	10·67	8·70	8·70
Total Length, in feet	35	26·25	23·33	17·5	7·0	6·9	5·8
Length of Rifled Portion of Bore, in inches	..	..	..	..	65·0	62·6	53·0
Length of Powder Chamber, in inches	..	..	..	..	8·0	10·7	..
Length of Bore in Calibres, including Powder Chamber	31·9	35	35	35	17·4	21·4	..
Number of Grooves, in ins.	..	..	..	..	16	24	12
Depth of Grooves in ins.	..	..	..	..	0·055	0·050	0·050
Twist of Rifling in cals.	..	..	..	..	50	40	41
Total Weight, in tons	55·7	19·44	13·64	6·26	0·87	0·45	0·35
Weight of Steel Shell, in lbs.	731	..	..	..	..	..	..
Weight of Chilled Shell, "	..	..	..	..	..	..	..
Weight of Common Shell, "	..	268·2	192·3	73·35	24·2	15·2	12·6
Weight of Case Shot, "	..	..	..	..	22·3	15·2	11·0
Weight of Firing Charge: Steel Shell, "	338	..	..	89·38	..	..	..
Weight of Firing Charge: Chilled Shell, "	..	..	..	39·6	..	..	..
Weight of Firing Charge: Common Shell, "	..	180	88·2	39·6	2·6	3·1	1·3
Muzzle Velocity, in feet	2090	2376	1925	2080	..	1444	..
Muzzle Energy: Total, foot-tons	..	10,500	..	2682	..	..	..
Muzzle Energy: Per Inch Circumference, foot-tons	22·130	371·4	..	142·3	..	..	..
Perforation at Muzzle, in inches	..	20·2	..	12·50	..	..	..
Perforation at Muzzle, by Tresidder's formula	28·3	24·0	15·7	..	..	..	..
Perforation Krupp Steel, 3000 yds., inches	8	6	..	..	..	..	..

NEW PATTERN RUSSIAN NAVAL GUNS.

The following guns are in use in the Russian Navy, the ballistics being somewhat as under:—

	12-in.	10-in.	9-in.	8-in.
Weight	59 tons	32 tons	..	..
Length	40 cals.	45 cals.	45 cals	45 cals.
Projectile	720 lbs	488 lbs	403 lb.	188 lbs
Muzzle Velocity	2600 f.s	2600 f.s	2500 f.s	2800 f.s
Perf. Wt. Ir. Muzzle	38 ins.	35 ins.	32 ins.	27 ins.
Perf. Wt. Ir. 2000 yds	30 "	27 "	24 "	20 "
Perf. K.S. 3000 yds.	12 "	10½ "	8½ "	6½ "

Q.F. GUNS.

	6-in.	4·7-in.	12-pdr.
Length	45 cals.	95 cals.	50 cals.
Projectile	89 lbs.	46 lbs.	12 lbs.
Muzzle Velocity	2900 f.s.	2600 f.s.	2700 f.s.
Perf. Wt. Ir. Muzzle	22½ ins.	15½ ins.	10·2 ins.
Perf. Wt. Ir. 2000 yds.	13 "	9 "	4·8 "
Perf. K.S. 3000 yds.	4¾ "	..	..

There exist also 15 and 10·7 cm. Krupp guns.

SPANISH NAVAL ORDNANCE.

	Hontoria, Pattern 83.								Armstrong, Pattern 83.			Armstrong.			Krupp.							
	Breech Loading.											Muzzle Loading.		Pattrn. 81 B.L.	Breech Loading.		Q.F. guns.					
Designation by Calibre	32-cm.	28-cm.	24-cm.	20-cm.	18-cm	16-cm.	14-cm	12 cm.	12-cm.	8·7-cm.	7·5-cm. long.	22·86-cm	20·3-cm	6-in.	15-cm.	12-cm.	15-cm.	14-cm.	12-cm.	75-mm.	57-mm.	47mm.
Calibre, in inches	12·60	11·02	9·45	7·87	7·09	6·34	5·51	4·72	4·72	3·4	2·95	9·00	8·00	6·00	5·87	4·72	5·9	5·51	4·72	2·95	2·24	1·85
Length: Total length, in feet	38·7	33·8	29·0	..	21·75	19·3	16·91	14·5	13·75	7·9	7·50	13·0	11·0	14·5	17·13	11·81	19·6	20·7	..	..	..	..
Length: Rifled Portion, in inches	352·4	309·1	..	..	..	170·6	149·1	126·0	135·8	75·0	70·7	104·0	102·0	126·9	..	..	..	..	..	..	..	..
Length: Powder Chamber, in inches	86·8	77·1	..	..	..	49·8	53·9	39·4	19	13	13	..	..	29·7	..	..	..	..	..	..	..	..
Length: Bore, in calibres	35	35	30	..	30	35	35	35	33	27	28·7	14	14·75	26·1	35	30	37	45	45	40	42	40
No. of Grooves	80	70	60	50	45	40	35	30	22	20	18	6	4	28	36	32	..	..	..	..	..	..
Depth of Grooves, in ins.	0·06	0·06	0·05	0·06	0·04	0·04	0·04	0·04	0·03	0·03	0·03	0·18	0·18	..	0·06	0·06	..	..	..	..	..	..
Twist of Rifling, in cals.	From 0 to 30.								40	30	35	45	40	100 to 40	25	25	..	..	..	..	..	..
Total Weight, in tons	47·3	32·5	20·7	11·5	8 71	6·1	4·1	2·6	2·2	0·45	0·35	12·0	9·0	4·0	4·7	2·1	4·39	4·8	2·65	0·9	0·34	0·23
Weight: Armour piercing projectile, in lbs.	1041	694·3	438·7	253·5	187·4	130·1	86·0	53·1	39·2	..	..	250·0	180·0	78·3	84·9	43·65	100	70	55	14	6	3·3
Weight: Common Shell, in lbs.	879·6	586·4	370·4	213·8	..	112·4	75·0	47·2	36·4	14·1	11·5	250·0	180·0	73·6	65·5	34·61	..	..	..	..	..	..
Weight: Ring Segment, in lbs.	886·3	590·8	370·4	211·6	..	112·4	75·0	47·6	38·6	15·4	11·7	..	..	83·6	..	34·61	..	..	..	..	..	..
Firing Charge: Armour-piercing projectile, in lbs.	485·0	352·7	220·5	112·4	94·8	66·1	44·1	28·7	16·0	..	..	50·0	35·0	34·0	37·48	19·29	..	..	15·4	7·1	1·93	..
Firing Charge: Other projectiles	463·0	319·7	220·5	..	..	61·7	..	28·7	11·9	4·0	4·0	33·0	21·0	24·9	25·4	..	..	..	..	..	..	..
Muzzle Velocity, in feet	2034	2034	2034	2034	2034	2054	2001	1988	2000	1625	1709	1339	1339	1929	2001	1887	2264	2460	2423	2100	1870	2330
Muzzle Energy: Total, in ft.-tons	29850	24030	12580	7271	5374	3806	2386	1511	1087	258	233	3105	2239	2018	2357	1076	3554	2936	2238	428	145	124
Perforation at Muzzle, in inches	32·9	28·7	24·6	20·5	18·6	16·6	13·9	11·6	9·3	..	..	10·6	9·6	11·0	12·7	9·7	17·0	16·5	15·5	7·9	5·0	5·7
Perforation Krupp Steel, 3000 yards	11	8	6¼	4¾	4¼	3½	..	..														

Note.—The Carlos V. has 11-in. 45 cal. guns. M.V. probably 2500 f.s.

NAVAL ORDNANCE OF SWEDEN AND NORWAY.

	Sweden.										Norway.								
	Armstrong.					Bofors.	New Pattern Q.F.		M. 85.	M. 89.	Modern Guns.								
Designation by Calibre, in cms.	15·2	25	25	25	24	21	15	12	25	15	21	21	21	15	15	12	12	76mm.	7cm.
Calibre, inches	6·0	10	10	10*	9·45	8·2	Q.F. 5·9	Q.F. 4·7	10·00	6·0	8·24	Q.F. 8·0	Q.F. 8·24	5·9	Q.F. ..	Q.F. 4·7	Q.F. 4·7	3·0	2·8
Total Length, feet	..	33·4	29·5	28·6	27·0	30·7	22·2	17·9	28·33	16·98	24·0	27·9	31·3	19·6	..	..	..	..	..
Length: Rifled Portion of Bore, ins.	..	..	..	..	..	..	..	..	2609	155·2	..	..	..	..	..	..	..	..	..
Length: Chamber, "	..	..	..	..	..	..	..	..	58·1	35·2	..	..	..	..	..	..	..	..	..
Length: Bore in calibres, "	50	40	32	35	32·4	43	43	43·3	32·9	32	32	40	43·8	37·1	43·8	45	43·9	40	38
Number of Grooves	..	..	..	..	..	..	..	..	42	28	..	..	..	..	..	..	..	..	..
Twist of Rifling	..	..	..	..	..	..	..	..	40	30	..	..	..	..	..	..	..	..	..
Total Weight, tons	7·8	30*	29·5	28·6	23·5	16·3	5·8	2·7	29·8	5·2	13·9	15·5	18·7	5·6	..	3·1	2·65	0·6	0·63
Weight of Armour-piercing Shell in lbs.	100	450	450	450	400	309	100	46	449·7	100	309	210	309	112	..	46	45	12·5	10·3
Weight of Common Shell, in lbs.	..	..	401	401	..	..	..	..	401·2	100	..	..	..	..	..	..	..	..	..
Weight of Firing Charge: Armour-piercing Shell, in lbs.	37·5	160†	242	†	182	..	18	9·15	242·5	54·0	115	32	47	58·4	..	6·6	8·4	1·7	1·9
Weight of Firing Charge: Common Shell, lbs.	..	..	..	..	..	..	..	..	242·5	..	..	..	..	..	..	..	..	..	..
Muzzle Velocity, feet.	2800	2600*	2100	2362	2051	2297	2460	2428	2100	2067	1903	2242	2300	2070	2502	2361	2570	2200	2279
Muzzle Energy, Total foot-tons	5442	21120	13760	17406	11670	11303	4196	1893	13750	2964	7760	7319	11344	3328	..	1785	2060	419	404
Perforation through Iron by Tresidder's formula	22·8	33·6	24·5	29·2	22·9	25·7	18·9	14·2	24·5	13·9	19·2	20·2	25·6	15·6	..	13·6	15·3	8·0	8·4
Perforation Krupp Steel, 3000 yds.	4¾	10½	6	8	6	6½	4¼	..	6½	..	4¾	4¾	6½	..	..	..	..	..	..

* Schneider-Canet. There are also 6-pdrs., with M.V. 2165 f.s. to 2310 f.s., and 3-pdrs., with M.V. 2428 f.s. † Smokeless powder.

UNITED STATES NAVAL ORDNANCE.

NATURE OF GUN.	Calibre.	Weight.	Total Length.	Total Length of Bore.	Length of Rifling.	Twist of Rifling.	Length of Chamber.	Weight of Service Charge.		Weight of Projectile.	Muzzle Velocity (Service).	Muzzle Energy.	Perforation of Wrought Iron at Muzzle.†	Perforation of Krupp Steel at 3000yds.
								Brown Powder.	Smokeless Powder.		Brown Powder.			
	inch.	tons.	feet.	inch.	inch.		inch.	lbs.	lbs.	lbs.	ft.-seconds.	ft.-tons.	inch.	inch.
3-in. (14 pr.)	3	0·87	12·5	149·7	125·5	..	21·3	..	5	14	3000	874	13·5	..
4-in. Q.F., Mark I.	4	1·5	13·7	157·3	130·3	zero to 1 in 25	24·7	12 to 14	..	33	2000	915	9·8	..
4-in. Q.F. Gun	4	1·5	13·7	157·5	128·1	..	25·4	..	..	33	2000	..	9·8	..
4-in. Q.F., Mark VII., of 50 Cals.	4	2·56	17·0	200·0	168·4	..	31·6	..	15	32	2900	1,999	16·9	..
5-in. Q.F., Mark I.	5	2·8	13·5	150·3	120·8	1 in 180 to 1 in 30	27·1	26 to 29	..	60	2000	1,660	11·8	..
5-in. Q.F. Gun	5	3·1	17·4	191·5	164·4	zero to 1 in 25	32·0	28 to 30	..	50	2300	1,834	13·2	..
5-in. Q.F., Mark V.	5	4·46	21·3	250	212·9	..	37·2	..	27	60	2900	3,503	20·5	4½
6-in. B.L.R., Mark I.	6	4·8	15·8	176·0	136·7	1 in 180 to 1 in 30	36·9	50	..	100	2000	2,773	..	..
6-in. B.L.R., Mark II.	6	4·9	16·1	180·1	144·9	..	32·7	45 to 48	..	100	2000	..	13·8	..
6-in. B.L.R., Mark III., of 30 Cals.	6	4·8	16·3	183·8	147·3	zero to 1 in 25	34·0	44 to 47	..	100	2000	..	..	..
6-in. B.L.R., Mark III., of 35 Cals.	6	5·2	18·8	213·8	177·3	..	34·0	..	..	100	2080	2,990	14·7	..
6-in. B.L.R., Mark III., of 40 Cals.	6	6·0	21·3	243·8	207·3	..	34·0	..	..	100	2150	3,204	15·4	..
6-in. Q.F. Gun	6	6·0	21·3	243·8	204·3	..	37·0	44 to 47	..	100	2150	3,200	15·4	..
6-in. Q.F., Mark VI.	6	8·17	25·0	293·7	245·3	..	48·4	..	46	100	2900	5,838	24·2	5
7-in. Q.F.	7	..	..	..	..	..	..	..	74	165	2900	9,646	28·7	6½
8-in. B.L.R., Mark I.	8	12·3 12·9	21·5	239·9	195·2	1 in 180 to 1 in 30	42·1	105 to 115	..	250 250	2000 2000	6,932	19·0	4½
8-in. B.L.R., Mark II.	8	13·0	21·5	239·9	195·2	..	42·1	..	..	..	..	..	19·0	4½
8-in. B.L.R., Mark III., of 35 Cals.	8	13·1	25·4	290·5	242·8	zero to 1 in 25	45·1	..	..	250	2080	7,498	20·1	4¾
8-in. B.L.R., Mark III., of 40 Cals.	8	15·2	28·7	330·5	282·8	..	45·1	..	..	250	2150	8,011	21·1	5
8-in. B.L.R., Mark V., of 45 Cals.	8	18·0	28·6	335·0	271·0	..	64·0	..	115	250	2800	13,602	31·4	8
10-in. B.L.R., Mark I., of 30 Cals.	10	25·7	27·4	306·3	247·3	1 in 180 to 1 in 35	57·2	225 to 240	..	500	2000	13,864	24·0	6½
10-in. B.L.R., Mark I., of 35 Cals.	10	27·1 28·2	30·5	343·8	283·7	zero to 1 in 25	57·2	..	..	500	2060	14,709	25·0	6¾
10-in. B.L.R., Mark II., of 30 Cals.	10	25·1	27·4	307·3	247·3	zero to 1 in 26·8	57·2	..	..	500	2000	13,864	24·0	6½
10-in. B.L.R., Mark II., of 35 Cals.	10	27·6	31·2	354·9	294·9	zero to 1 in 25	57·2	..	..	500	2100	15,285	25·8	7
10-in. B.L.R., Mark III., of 40 Cals.	10	33·4	33·3	389·0	313·4	..	75·6	..	240	500	2800	27,204	42·0	12
12-in. B.L.R., Mark I.	12	45·2	36·8	419·2	343·1	..	74·1	425	..	850	2100	25,985	30·8	9
12-in. B.L.R., Mark III., of 40 Cals.	12	52	41·8	480·1	388·1	..	91·9	..	350	850	2800	46,246	47·2	16
13-in. B.L.R., Mark I. and II.	13	60·5	40·0	454·5	370·5	..	80·9	..	230	1100	2100	33,627	33·5	11

NOTE.—The weight of fixed ammunition for Q.F. 4-in. and 5-in. guns is 58 and 95 lbs. respectively.

† By Tresidder's formula.

ELSWICK GUNS.

This Table is supplied by the Manufacturers.

				*							Naval Landing.	Field.	Horse Artillery.	Field.	Jointed Howitzer.			Howitzer.	Howitzer.		
Diameter of Bore, ins.	1·46	1·46	1·85	1·85	1·85	2·24	2·24	3	3	3	3	3	3	3·3	3·3	3·5	4	4·3	4·7	4·7	4·7
do. do. mm.	37	37	47	47	47	57	57	76	76	76	76	76	76	84	84	89	102	109·2	120	120	120
Length of Bore, cals.	25	45	40	50	46	40	50	40	50	50	22	30	23	28	16	40	50	12·5	12	40	45
Weight of Gun	lb. 79	lb. 268	lb. 506	lb. 1067	lb. 560	lb. 840	cwt. 10½	cwt. 12	cwt. 18	cwt. 18½	cwt. 6·0	cwt. 7·5	cwt. 6	cwt. 9	lb. 407	cwt. 24	cwt. 41·0	cwt. 7	cwt. 10	cwt. 42	cwt. 53
do. Projectile, lbs.	1·1	1·5	3·3	3 3	3·3	6	6	12½	14	12·5	13·2	14·3	12·5	18·5	15	20	31	40	45	45	45
do. Cordite Charge	oz. 1·125	oz. 4.5	oz. 7·94	lb.oz. 1 4⅝	oz. 8·0	oz. 9·2	lb.oz. 1 5	lb.oz. 1 10	...	lb.oz. 3 4	lb.oz. 1 1½	oz. 15·75	lb.oz. 1 0½	lb.oz. 1 3¾	oz. 11	lb. 4·0	...	oz. 15·75	lb. 1·5	lb. 5·5	lb.oz. 8 2½
do. M.D. do., lbs.	...	...	...	1·6	...	...	...	...	4·0	4·0	...	...	...	...	...	...	10	...	...	...	...
Muzzle Velocity, f.s.	1540	2300	2132	2800	2300	1968	2592	2210	2690	2800	1700	1640	1700	1635	1090	2430	2850	980	1070	2200	2552
Muzzle Energy, f.t.	18	55	104	179	121	161	280	473	702	680	265	267	250	336	123	819	1746	266	357	1510	2110
Penetration at Muzzle, ins.	1·9	4·3	5·2	7·8	5·7	5·6	8·6	8·8	11·9	11·6	...	...	...	...	...	11·0	16·0	...	...	11·6	15·1
Rounds per Minute ...	...	25	30	30	30	25	25	20	20	20	20	20	20	20	...	17	15	...	...	12	10
Penetration Krupp Steel, 3000 yds. ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

	Field Position.	Howitzer.		Howitzer.																	
Diameter of Bore, ins.	5	5	5·87	6	6	6	6	7·5	7·5	7·5	8	8	8·24	9·2	9·2	10	10	10	12	12	12
do. do. mm.	127	127	149	152	152	152	152	190	190	190	203	203	210	234	234	254	254	254	305	305	305
Length of Bore, cals.	32	8·4	46	12	40	45	50	45	50	50	45	50	44	46	50	40	45	50	40	40	45
Weight of Gun	tons 2	cwt. 9	tons 7	cwt. 25	tons 6·6	tons 7·35	tons 9	tons 13·8	tons 15·7	tons 16	tons 18·5	tons 21	tons 18·1	tons 27·65	tons 28	tons 31	tons 39	tons 41	tons 48·5	tons 51	tons 58
do. Projectile, lbs.	60	50	99·25	100	100	100	100	200	200	200	210	250	308·6	380	380	450	500	500	850	850	850
do. Cordite Charge	lb. 8·25	oz. 11·5	lb. 21·5	lb. 2·1	lb. 18·3	lb. 26	lb. 36	...	lb. 51	...	lb. 44	...	lb. 47	lb. 103	...	lb. 81·5	lb. 136	...	lb. 141	lb. 205	...
do. M.D. do., lbs.	...	...	...	...	...	32	46	74·25	63	76	...	90	...	...	151	...	160	200	...	...	325
Muzzle Velocity, f.s.	2095	782	2625	857	2500	2800	3050	2900	2850	3000	2650	3000	2300	2650	3030	2400	2750	3000	2400	2500	2900
Muzzle Energy, f.t.	1826	212	4742	509	4334	5436	6492	11663	11264	12481	10226	15600	11320	18500	24190	17973	26219	33318	33949	36800	49569
Penetration of Muzzle, ins.	12·9	...	21·5	...	19·5	25·7	26·3	31·8	31·5	32·75	26·0	35·7	27·0	34·0	41·4	29·9	39·8	45·1	38·4	40·9	51·0
Rounds per Minute ...	9	...	8	..	8	8	8	5	5	5	4	4	3	2	2	2	2	2	2	2	2
Penetration Krupp Steel, 3000 yds. ...	...	...	4½	...	4¼	4¾	5	7¾	7¼	8	7	8¾	7½	9	11¼	8	11½	13¼	12	13	17

* Also arranged for Landing Carriage.

SOME RESULTS ACTUALLY OBTAINED.

4·7-in. 42 cwt. gun with single motion breech mechanism: 5 rounds in 22 seconds at Silloth at a target—2 hits, range 1000 yards; 7 rounds in 25 seconds at drill.
Barfleur prize firing, 4·7-in. Q.F., 5·7 hits per gun per minute.

6-in. gun with single motion breech mechanism: 7 rounds in 61 seconds at Silloth, Cordite charge; 4 rounds in 20 seconds at drill.
Terrible (China), prize firing, 6-in. Q.F., 4·25 hits per gun per minute.
Ariadne prize firing, 6-in. Q.F., 19 rounds, 17 hits in 2 minutes.

12-in. gun, interval 49 seconds, Illustrious, 6 rounds were fired from 1 turret in 1 minute 47 seconds, starting with both guns loaded.
Pair 12-in. guns, Goliath, 8 rounds in 2 minutes 10 seconds.
Ocean (China), prize firing, 12-in. B.L., 0·54 hits per gun per minute.
Mars (Channel) „ „ 0·42 „ „

VICKER'S SONS & MAXIM'S GUNS AND MOUNTINGS.

This Table is supplied by the Manufacturers.

		37 mm. 30 cal.	37 mm. 42·5 cal.	3-pdr. 50 cal.	6-pdr. 42·3 cal.	6-pdr. 50 cal.	Mountain. 75 mm. 10·7 cal.	Field. Light. 3-in. 22.64 cal.	Field. Heavy. 3-in. 29 cal.
Gun.	Diameter of Bore . ins.	1·457	1·457	1·85	2·244	2·244	2·953	3	3
	Length of Bore . . ins.	43·5	62	92·5	95	112·2	31·6	67·92	87·2
	Length of Gun . . ins.	73·75	94	98·9	104·4	116·4	35·85	72·22	90·63
	Maximum pressure in Chamber, tons per sq. in.	13	14	16	15	15	8	14·5	15
	Weight of Charge lbs.	·0782	·1875	1·066	·9375	1·469	·391	1·078	1·875
	Weight of Projectile lbs.	1	1·25	3·3	6	6	12·5	12·5	17·63
	Weight of Gun . . .	c. q. l. 3 2 24	c. q. l. 5 1 19	c. q. l. 5 2 4	c. q. 6 2	c. q. l. 8 1 18	c. q. l. 2 0 13	c. q. 5 3	c. q. 7 2
	Muzzle Velocity . f.s.	1800	2350	2800	2300	2500	918	1700	1700
	Muzzle Energy . f.t.	22·5	48	179·4	220	260	73	250	353·4
	Penetration of Wrought Iron Plate at Muzzle. Gavre formula . ins.	1·9	3·3	6·7	6·2	7	..	..	..
	Penetration of Mild Steel Plate at Muzzle. Gavre formula . . . . ins.	1·5	2·6	5·1	4·8	5·4	..	..	..
	Penetration of Hard Steel Plate at 3000 yards. Gavre formula . ins.	..	..	..	..	..	..	..	..
	Rounds per minute . .	300	300	30	23	28	14	20	20
	Penetration Krupp Steel, 3000 yds.	..	..	..	..	..	..	..	..
Mounting.								Weight of equipment with 18 rounds.	Weight of equipment with 36 rounds.
	Weight of Mounting complete with Shield . .	c. q. l. 4 1 10	c. q. l. 3 2 5	c. q. 5 3	c. q. 8 2	c. q. l. 8 3 21	c. q. l. 5 3 5	t. c. q. 1 8 3	t. c. 1 16
	Thickness of Shield . ins.	¼	no	no	3/16	3/16	no	⅛	no
	Weight of Shield . . .	q. l. 3 11	shield	shield	1 cwt.	1 cwt.	shield	1 cwt.	shield
	Angle of Elevation . .	16°	13°	20°	20°	20°	26°	16°	16°
	Angle of Depression . .	25°	25°	20°	20°	15°	10°	8°	8°

		Naval. 3-in. 45 cal.	Naval. 3-in. 50 cal.	4-in. 45 cal.	4-in. 50 cal.	4·7-in. 45 cal.	4·7-in. 50 cal.	14 cm. 45 cal.	6-in. 45 cal.
Gun.	Diameter of Bore . ins.	3	3	4	4	4·724	4·724	5·512	6
	Length of Bore . . ins.	135	150	180	200	212·6	236·2	248	269·5
	Length of Gun . . ins.	139	154	186·35	206·35	220	243·6	257·7	279·2
	Maximum pressure in Chamber, tons per sq. in.	17	17	17	17	17	17	16·5	17·75
	Weight of Charge lbs.	3·3125	5·375	8·3	11·75	19·5	19·5	21·875	35·25
	Weight of Projectile lbs.	12.5	12·5	31	31	45	45	88·19	100
	Weight of Gun . . .	c. q. 14 3	c. q. l. 16 1 16	t. c. q. 1 14 1	t. c. q. 1 16 1	t. c. q. 3 3 3	t. c. 3 6	t. c. 5 18	t. c. q. 7 8 2
	Muzzle Velocity . f.s.	2800	3000	2700	2950	2925	3000	2860	3012
	Muzzle Energy . f.t.	679·5	780	1567	1870	2670	2810	4990	6290
	Penetration of Wrought Iron Plate at Muzzle. Gavre formula . ins.	10·2	11·25	13·6	15·4	16·65	17·25	22·1	23·65
	Penetration of Mild Steel Plate at Muzzle. Gavre formula . . . . ins.	7·9	8·7	10·5	11·9	12·9	13·4	17·1	18·4
	Penetration of Hard Steel Plate at 3000 yards. Gavre formula . ins.	..	..	..	..	..	4·2	6·2	6·3
	Rounds per minute . .	20	20	15	15	12	12	10	10
	Penetration Krupp Steel, 3000 yds.	..	..	..	..	..	4	5	5¼
Mounting.	Weight of Mounting complete with Shield . .	t. c. 1 5	t. c. q. 1 6 1	t. c. 3 3	t. c. q. 3 5 3	t. c. 3 16	t. c. q. 3 18 3	Depending on type of Mounting used.	
	Thickness of Shield . ins.	2	2	2 & 5/16	2 & 5/16	2 & 5/16	2 & 5/16		
	Weight of Shield . . .	c. q. 9 0	c. q. 9 0	c. q. l. 17 0 22	c. q. l. 17 0 22	t. c. q. 1 4 3	t. c. q. 1 4 3		
	Angle of Elevation . .	20°	20°	20°	20°	20°	20°		
	Angle of Depression . .	10°	10°	7°	7°	7°	7°		

		6-in. 50 cal.	7·5-in. 45 cal.	7·5-in. 50 cal.	8-in. 45 cal.	9·2-in. 47 cal.	9·2-in. 50 cal.	10-in. 45 cal.	12-in. 40 cal.	12-in. 45 cal.
Gun.	Diameter of Bore . ins.	6	7·5	7·5	8	9·2	9·2	10	12	12
	Length of Bore . . ins.	300	337·5	375	360	429·3	460	450	480	540
	Length of Gun . . ins.	310·07	349·2	386·7	372·1	442·35	473	464·9	496·5	557·55
	Maximum pressure in Chamber, tons per sq. in.	18	18	17·5	17	18	18	18	18	18
	Weight of Charge lbs.	48·12	78·25	80·03	94	170·5	184	217·25	309	310
	Weight of Projectile lbs.	100	200	200	250	380	380	500	850	850
	Weight of Gun . . .	t. c. 7 19	t. c. q. 14 0 2	t. c. 16 0	t. c. q. 18 16 2	t. c. 28 1	t. c. q. 27 16 1	t. c. q. 35 6 3	t. c. 50 7	t. c. q. 57 8 3
	Muzzle Velocity . f.s.	3220	2875	3007	2850	3025	3110	2900	2750	2945
	Muzzle Energy . f.t.	7190	11465	12540	14080	24110	25485	29160	44570	51120
	Penetration of Wrought Iron Plate at Muzzle. Gavre formula . ins.	26·1	28·75	30 75	31·1	39·25	40·85	41·1	45·8	50·5
	Penetration of Mild Steel Plate at Muzzle. Gavre formula . . . . ins.	20·3	22·25	29·3	24·1	30·45	31·7	31·9	35·5	39·2
	Penetration of Hard Steel Plate at 3000 yards. Gavre formula . ins.	6·8	8·9	9·35	10·0	13·35	13·85	14·5	17·45	19·1
	Rounds per minute . .	10	8	8	6	4	4	3	2	2
	Penetration Krupp Steel, 3000 yds.	5¾	7¼	8	8¼	11½	12	12½	15½	17½

SCHNEIDER - CANET GUNS.

The Information in this Table is given by the Manufacturers.

Calibre, in centimètres	30·5		27·5		24		20			15			12			10			7·5		6·5		5·7		4·7	3·7
Calibre, in inches	12·0	12·0	10·8	10·8	9·45	9·45	7·9	7·9	7·9	5·9	5·9	5·9	4·7	4·7	4·7	3·9	3·9	3·9	3·0	3·0	2·5	2·5	2·25	2·25	1·85	1·45
Length, in calibres	40	45	40	45	40	45	40	45	50	40	45	50	40	45	50	40	45	50	45	50	45	50	50	60	60	60
Weight, tons	38·6	44·0	29·0	32·7	17·9	21·4	11·6	12·6	13·8	5·4	5·9	6·6	2·8	3·1	3·4	1·7	1·8	2·0	·82	·94	·57	·66	·45	·55	·31	·17
Weight of A.P. Projectile, lbs.	683	683	507	507	331	331	198	198	198	88	88	88	46	46	46	28½	28½	28½	13¼	13¼	8¾	8¾	6	6	3¼	1¾
Weight of Charge	Not	stated																								
Muzzle Velocity, ft.-secs.	3051	3248	3051	3248	3051	3248	3051	3215	3346	3018	3166	3314	3018	3150	3314	3018	3150	3314	2772	2953	2772	2953	2920	3248	3248	3150
Muzzle Energy, ft.-tons	44130	50010	32780	37130	21850	24240	12792	14210	15390	5569	6128	6709	2912	3169	3506	1846	1918	2123	707	818	467	540	354	440	238	120
Perforation of Steel at muzzle (Gavre formula)	40·5	44·7	37·4	41·2	31·4	34·6	26·4	28·4	30·3	19·2	20·4	22·2	15·1	16·2	17·5	13·0	13·8	14·9	8·7	9·5	7·5	7·9	7·1	8·3	6·5	5·1
Perforation, Wrought Iron, at muzzle, Tresidder's formula	48·0	53·0	43·3	47·6	37·7	41·2	32·0	34·3	36·6	24·4	26·0	28·2	19·6	20·7	22·6	17·3	18·4	19·8	..	..	..	..	..	..	..	..
Perforation of Krupp Steel, 3000 yards	15	16½	13	14½	10	11	8	8¾	9¼	5	5½	5¾	4	4¼	4½	..	..	4	..	..	..	..	..	..	..	..

KRUPP QUICK-FIRING GUNS, Mark 1900.

Tables supplied by Manufacturers.

LIGHT GUNS.

Calibre, in centimètres	7·5			10·5			12			15			21			24			28			30·5		
Calibre, in inches	2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01		
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·0	24·46	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Gun, in lbs.	1485·9	1700·9	1935·7	3748	4189	4740	5512	6283	7055	10582	12015	13558	29320	33290	37254	44090	50264	56443	70104	79811	89503	90610	10317	115742
Weight of Gun, in tons	0·69	0·79	0·89	1·73	1·93	2·18	2·54	2·90	3·25	4·88	5·54	6·25	13·51	15·34	17·17	20·32	23·16	26·01	32·31	36·78	41·25	41·76	47·55	53·34
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981 0	981·0	981·0
Weight of Charge, in lbs.	2·24	2·62	3·07	8·21	9·53	10·87	12·23	14·23	16·25	23·54	27·34	31·19	64·9	75·62	86·42	97·68	113·98	130·07	155·10	181·00	206·57	200·86	233·91	266·93
Muzzle Velocity, in ft.-secs.	2385	2572	2726	2638	2815	2992	2674	2867	3048	2651	2841	3018	2657	2848	3028	2657	2851	3031	2661	2851	3031	2654	2848	3028
	2116	2283	2418	2326	2484	2638	2359	2526	2687	2379	2546	2707	2385	2559	2720	2365	2533	2697	2352	2523	2680	2356	2526	2684
Muzzle Energy, total ft.-tons	452·7	526·0	591	1491	1697	1917	2298	2636	2982	4408	5060	5721	12198	14005	15845	18362	21105	23880	29264	33561	37917	37756	43403	49050
Perforation through Steel, in ins.	5·97	6·69	7·21	9·8	10·75	11·73	11·58	12·8	13·94	14·65	16·14	17·60	21·06	23·23	25·39	24·33	26·89	29·37	28·74	31·73	34·65	30·6	34·76	37·99
Perforation through Iron, Tresidder's formula	8·2	9·2	10·1	13·3	14·5	16·0	15·5	17·2	18·8	19·3	21·2	23·2	27·1	30·1	32·9	31·2	24·7	37·8	36·0	40·0	43·8	39·1	43·5	46·4
Perforation Krupp Steel, 3000 yards	..	..	..	..	..	..	..	..	4	4¼	4½		7	7¾	8¾	8¾	10	11	11	13	15	13½	15	17

HEAVY GUNS.

Calibre, in centimètres	7·5			10·5			12			15			21			24			28			30·5		
Calibre, in inches	2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01		
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·0	24·46	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Gun, in lbs.	1860·7	2094·4	2325·8	4519·2	5115·1	5688	6724·2	7606·2	8488	12897	14661	16314	35711	40341	44972	53792	60843	67904	85544	96784	108030	110671	125003	139772
Weight of Gun, in tons	0·85	0·96	1·07	2·08	2·35	2·62	3·10	3·51	3·91	5·94	6·76	7·52	16·46	18·59	20·73	24·79	28·04	31·29	39·42	44·60	49·79	51·00	57·61	64·42
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·43	2·78	3·15	8·71	10·12	11·53	13·01	15·10	17·22	24·91	28·88	33·04	68·78	80·03	91·49	103·84	120·59	137·79	165·12	191·80	218·70	213·40	247·58	282·85
Muzzle Velocity, in ft.-secs.	2484	2661	2822	2723	2910	3094	2763	2976	3159	2743	2949	3133	2749	2953	3140	2746	2956	3143	2749	2959	3140	2746	2953	3140
	2205	2362	2507	2402	2566	2730	2438	2625	2785	2457	2644	2808	2467	2654	2822	2441	2628	2795	2431	2618	2776	2434	2618	2785
Muzzle Energy, total ft.-tons	490·5	562·8	633·8	1588	1814	2049	2452	2840	3204	4711	5450	6151	13037	15070	17039	19588	22702	25655	31205	36142	40725	40338	46695	52729
Perforation through Steel, in ins.	6·39	7·01	7·64	10·28	11·26	12·32	12·13	13·50	14·69	15·36	17·01	18·54	22·13	24·49	26·73	25·47	28·31	30·87	30·12	33·47	36·42	32·4	36·65	40·08
Perforation through Iron, Tresidder's formula	8·7	9·7	10·6	13·9	15·4	16·8	16·3	18·1	19·8	20·1	22·3	24·5	28·5	31·8	34·6	32·7	36·3	39·8	37·6	42·2	46·5	41·0	45·8	50·1
Perforation Krupp Steel, 3000 yards	..	..	..	..	..	..	..	4	4¼	4½	4¾	5¼	7½	8¼	9	9	10½	12	12	14	16	14	16	18½

NOTE.—Every one of the Guns included in the Tables has been actually constructed and can be supplied on order.

KRUPP QUICK-FIRING GUNS, Mark 1901.

Tables supplied by Manufacturers.

LIGHT GUNS.

Calibre, in centimètres	7·5			10·5			12			15			21			24			28			30·5		
Calibre, in inches	2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01		
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·00	24·44	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Gun, in lbs.	1488	1711	1936	3748	4189	4740	5512	6283	7055	10582	12015	13558	29321	33290	37254	44090	50264	56443	70104	79811	89503	90610	103174	115742
Weight of Gun, in tons	0·68	0·79	0·89	1·73	1·93	2·18	2·54	2·90	3·25	4·88	5·54	6·25	13·51	15·34	17·17	20·32	23·16	26·01	32·31	36·78	41·25	41·76	47·55	53·34
Weight of Steel Projectile, in lbs.	11·5	11·5	11·5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·77	3·12	3·54	10·47	12·57	14·33	15·66	17·97	20·62	29·99	34·40	39·47	82·47	94·59	108·71	124·58	143·10	164·27	198·41	227·07	262·35	255·73	293·21	337·30
Muzzle Velocity, in ft.-secs.	2690	2890	3068	2835	3022	3199	2877	3038	3225	2854	3008	3196	2851	3015	3196	2854	3018	3199	2851	3018	3202	2854	3018	3199
	2388	2566	2723	2500	2661	2822	2539	2677	2841	2556	2697	2858	2559	2707	2868	2533	2687	2845	2523	2664	2835	2526	2674	2838
Muzzle Energy, total ft.-tons	576	665	749	1720	1952	2191	2659	2969	3340	5099	5680	6389	14037	15684	17620	21169	23718	26655	33561	37595	42435	43564	48728	54859
Perforation through Steel, in ins.	7·13	7·91	8·58	10·87	11·92	12·93	12·87	13·90	15·15	16·15	17·41	18·98	23·20	25·13	27·30	26·96	29·20	31·73	31·80	34·45	37·48	34·94	37·84	41·10
Perforation through Iron, Tresidder's formula	9·9	11·0	11·7	14·7	17·24	18·77	18·35	19·91	21·77	22·66	24·52	26·84	31·73	34·51	37·65	36·47	39·66	43·27	42·52	46·28	50·57	46·42	50·47	55·08
Perforation Krupp Steel, 3000 yards	..	..	..	..	..	..	3·52	3·74	4·02	4·98	5·29	5·66	8·14	8·65	9·22	9·84	10·45	11·13	12·11	12·86	13·70	13·58	14·41	15·33

HEAVY GUNS.

Calibre, in centimètres	7·5			10·5			12			15			21			24			28			30·5		
Calibre, in inches	2·95			4·13			4·72			5·91			8·27			9·45			11·02			12·01		
Total Length of Gun, in cals.	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50	40	45	50
Total Length, in feet	9·84	11·07	12·30	13·78	15·5	17·22	15·75	17·7	19·69	19·55	22·00	24·44	27·56	30·9	34·45	31·50	35·4	39·37	36·75	41·3	45·93	40·03	45·0	50·03
Length of Bore, in inches	108·66	123·43	138·19	153·55	174·21	194·89	175·20	199·25	222·45	218·12	247·49	276·78	305·91	347·29	388·59	350·80	398·28	445·28	409·46	464·62	519·70	445·67	505·95	565·76
Weight of Gun, in lbs.	1861	2094	2326	4519	5115	5688	5842	6724	7606	11244	12897	14661	31080	35711	40341	46741	53792	60843	74514	85544	96784	96343	110671	125003
Weight of Gun, in tons	0·85	0·96	1·07	2·08	2·35	2·62	2·70	3·10	3·51	5·18	5·94	6·76	14·32	16·46	18·59	21·54	24·79	28·04	34·34	39·42	44·60	44·40	51·00	57·61
Weight of Steel Projectile, in lbs.	11·5	11·5	11.5	30·86	30·86	30·86	46·30	46·30	46·30	90·39	90·39	90·39	249·1	249·1	249·1	374·8	374·8	374·8	595·2	595·2	595·2	771·6	771·6	771·6
	14·6	14·6	14·6	39·68	39·68	39·68	59·52	59·52	59·52	112·4	112·4	112·4	308·6	308·6	308·6	474·0	474·0	474·0	760·6	760·6	760·6	981·0	981·0	981·0
Weight of Charge, in lbs.	2·99	3·35	3·76	11·80	13·45	15·32	17·53	19·96	22·93	33·52	38·15	43·88	92·59	105·40	120·83	140·02	159·42	182·57	222·67	253·53	291·00	286·60	326·28	374·78
Muzzle Velocity, in ft.-secs.	2876	2999	3123	2930	3107	3281	2920	3097	3268	2882	3068	3242	2887	3068	3245	2897	3074	3248	2897	3074	3251	2894	3068	3248
	2664	2775	2885	2582	2740	2894	2572	2733	2887	2589	2753	2900	2592	2756	2913	2576	2733	2887	2562	2720	2871	2562	2720	2877
Muzzle Energy, total ft.-tons	620	703	795	1836	2065	2307	2736	3082	3429	5228	5905	6583	14125	16232	18168	21815	24557	27430	31690	39047	43564	44855	50341	56473
Perforation through Steel, in ins.	7·52	8·23	8·9[illegible]	11·40	12·40	13·40	13·15	14·29	15·43	16·42	17·91	19·37	23·62	25·76	27·91	27·54	29·98	32·43	32·48	35·37	38·31	35·63	38·71	42·01
Perforation through Iron, Tresidder's formula	10·5	11·3	12·0	16·46	17·97	19·50	18·76	20·49	22·21	23·05	25·24	27·42	32·34	35·42	38·53	37·29	40·76	44·27	43·51	47·56	51·73	47·39	51·72	56·35
Perforation Krupp Steel, 3000 yards	..	..	..	..	..	..	3·55	3·83	4·08	5·05	5·40	5·76	8·25	8·81	9·37	10·00	10·66	11·32	12·30	13·11	13·92	13·78	14·66	15·60

BETHLEHEM STEEL CO.

ORDNANCE.

This Table is supplied by the Manufacturers.

NATURE OF GUN.	Calibre in inches.	Calibre in cms.	Length of bore.	Length of gun.	Weight of gun.	Charge of smokeless powder.	Weight of projectile.	Muzzle velocity.	Muzzle energy.	Perforation at muzzle of U.S. standard face-hardened armour by capped A.P. projectiles.	Perforation Krupp steel 3000 yds.
			cals.	cals.	lbs.	oz.	lbs.	foot-seconds.	foot-tons.		
1-pr.	1·457	3·7	46·4	50	120	3	1	2300	37		..
3-pr.	1·851	4·7	46	50	550	19·5	3	2600	142	2	..
6-pr.	2·244	5·8	50	54	960	22·5	6	2400	240	2·5	..
3-in. Q.F., Light	3	7·62	27	33	720	22	15	1850	345	3·5	..
3-in. Q.F.	3	7·62	50	51·4	1900	lbs. 5	15	2800	8064	4·4	..
4-in. Q.F.	4	10·16	39·4	41·1	tons 1·5	8	33	2250	845	3·9	..
4-in. Q.F.	4	10·16	50	51	2·6	15	33	2900	1924	6·8	..
4·7-in. Q.F.	4·7	12	48·5	50	3·9	15	45	2850	2625	7·2	..
5-in. Q.F., No. 1 ‡	5	12·7	45·1	46·3	3·4	9·5	50	2200	2180	7·0	..
5-in. Q.F., No. 2	5	12·7	45·1	45·9	3·4	14	55	2600	2577	7·1	..
5-in. Q.F., No. 3 §	5	12·7	50	51·1	4·6	27	50	2900	3207	7·7	4¼
6-in. Q.F., No. 1 §	6	15·24	41	42·3	6·1	16	100	2200	3355	7·5	..
6-in. Q.F., No. 2	6	15·24	44	45	7·1	28	100	2600	4691	8·8	4½
6-in. Q.F., No. 3	6	15·24	50	51·5	7·9	46	100	2900	5830	10·6	5
8-in. Q.F., No. 1	8	20·32	45	46·5	16·6	90	250	2500	10,833	13	6½
8-in., No. 2 ‡.	8	20·32	32	35	9·6	83	300	2300	10,528	13·2	6½
10-in., No. 1 ‡	10	25·4	34·7	36·7	30	140	575	2300	21,086	17·2	9½
10-in., No. 2	10	25·4	40	41·4	32	140	500	2500	21,665	17·5	9½
10-in. Shell Gun	10	25·4	28·2	30	13	100	400	2200	13,420	13	7
12-in. ‡	12	30·48	35·3	36·9	51	240	1000	2300	36,671	21·7	13
12-in. Mortar ‡ ‖	12	30·48	10	11·76	13	50	800	1325	9736	9·5	..
18-in. Shell Gun	18	45·72	28	29·3	60	400†	2000	2250*	70,185	25·3	..

Guns from 3 inches to 6 inches fitted with either a metallic cartridge case or a Debange pad.

* This velocity is reached, allowing the usual factor of safety for the gun. With an 1830-lb. explosive shell (500 lbs. of wet gun-cotton), a velocity of 1980 foot-seconds was reached with 8·2 tons pressure.

† 75 per cent. cellulose, 25 per cent. nitro-glycerine.

‡ U.S. Army type.

§ U.S. Navy type.

‖ These mortars have been found very accurate at ranges up to 10,000 yards, when fired at obscured targets representing a ship's deck.

Table Relating to Conversion of Measures.

Length.

Metric to English. English to Metric.

I. Mètres.	II. Yards.	III. Feet.	IV. Inches.	V. Yards.	VI. Mètres.	VII. Feet.	VIII. Mètres.	IX. Inches.	X. Centimètres.
1	1·0936	3·2809	39·37	1	0·91438	1	0·30479	1	2·5400
2	2·1873	6·5618	78·74	2	1·82877	2	0·60959	2	5·0799
3	3·2809	9·8427	118·11	3	2·74315	3	0·91438	3	7·6199
4	4·3745	13·1236	157·48	4	3·65753	4	1·21918	4	10·1598
5	5·4682	16·4045	196·85	5	4·57192	5	1·52397	5	12·6998
6	6·5618	19·6854	236·22	6	5·48630	6	1·82877	6	15·2397
7	7·6554	22·9663	275·60	7	6·40068	7	2·13356	7	17·7797
8	8·7491	26·2472	314·97	8	7·31507	8	2·43836	8	20·3196
9	9·8427	29·5281	354·34	9	8·22945	9	2·74315	9	22·8596

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of yards	of feet	of inches	of mètres	of mètres	of centimètres
in 2354 mètres	in 12·4 mètres	in 30·5 centimètres	in 1026 yards	in 1742 feet	in 17·72 ins.
(see cols. I. & II.).	(see cols I. & III.).	(see cols. I. & IV.).	(see cols. V. & VI.).	(see cols. VII. & VIII.).	(see cols. IX. & X.)
mètres. yards.		Note, 1 m.=100 cm.		feet. mètres.	inches. cms.
2000=2187·3	mètres. feet.		yards. mètres.	1000=304·79	10·0 =25·400
300= 328·09	10 =32·809	cms. inches.	1000=914·38	700=213·36	7·0 =17·780
50= 54·68	2 = 6·562	30·0=11·811	20= 18·29	40= 12·19	0·7 = 1·778
4= 4·37	0·4= 1·312	·5= ·197	6= 5·49	2= 0·61	·02= ·051
∴ 2354=2574·44	∴ 12·4=40·683	∴ 30·5=12·008	∴ 1026=938·16	∴ 1742=530·95	∴ 17·72=45·009

Note.—A ready way of approximately converting all French measures into English inches is to multiply by 4 and apply the decimal point by common sense—Thus for a 15-cm. gun; 15 × 4 = 60. Now this Calibre cannot be 60 inches, nor can it be 0·6 inch; therefore it must be 6 inches. (The exact value is 5·906 in.)

Weight.

Metric to English. English to Metric.

I. Kilo-grammes.	II. Tons.	III. Pounds Avoirdupois.	IV. Grains Troy.	V. Tons.	VI. Milliers.	VII. Pounds Avoir-dupois.	VIII. Kilo-grammes.	IX. Grains. Troy.	X. Gramme.
1	·000984	2·2046	15432·3	1	1·016	1	0·4536	1	·0648
2	·001968	4·4092	30864·7	2	2·032	2	0·9072	2	·1296
3	·002953	6·6139	46297·0	3	3·048	3	1·3608	3	·1944
4	·003937	8·8185	61729·4	4	4·064	4	1·8144	4	·2592
5	·004921	11·0231	77161·7	5	5·080	5	2·2680	5	·3240
6	·005905	13·2277	92594·1	6	6·096	6	2·7216	6	·3888
7	·006889	15·4323	108026·4	7	7·112	7	3·1751	7	·4536
8	·007874	17·6370	123458·8	8	8·128	8	3·6287	8	·5184
9	·008858	19·8416	138891·1	9	9·144	9	4·0823	9	·5832

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of tons	of pounds	of grains	of milliers	of kilogrammes	of grammes
in 35 milliers	in 56·3 kilo-grammes.	in 120 grammes	in 38 tons	in 68 pounds	in 85 grains
(see cols. I. & II.	(see cols. I. & III.).	(see cols. I. & IV.	(see cols. V. & VI.).	(see cols. VII. & VIII).	(see cols. IX. & X.).
Note, 1000 kg. =1 millier).		Note, 1000 grms. = 1 kg.)			
milliers. tons	kgrms. lbs.	grammes. grains.	tons. milliers.	lbs. kgs.	grains. grammes.
30 = 29·53	50 =110·231	100=1543·23	30 = 30·48	60 = 27·216	80 = 5·184
5 = 4·92	6 = 13·228	20= 308·65	8 = 8·13	8 = 3·629	5 = 0·324
	0·3= ·661				
∴ 3 = 34·15	∴ 56·3=124·120	∴ 120=1851·88	∴ 38 = 38·61	∴ 68 = 30·845	∴ 85 = 5·508

Note.—7000 grains troy = 1 pound avoirdupois.

PRESSURE.

Metric to English.			English to Metric.				Atmospheric to English.		English to Atmospheric.	
I. Kilogrammes per square centimètre.	II. Pounds per square inch.	III. Tons per square inch.	IV. Pounds per square inch.	V. Kilogrammes per square centimètre.	VI. Tons per square inch.	VII. Kilogrammes per square centimètre.	VIII. Atmospheres.	IX. Tons per square inch.	X. Tons per square inch.	XI. Atmospheres.
1	14·223	·00635	1	·07031	1	157·49	1	·00656	1	152·38
2	28·446	·01279	2	·14062	2	314·99	2	·01313	2	304·76
3	42·668	·01905	3	·21093	3	472·48	3	·01969	3	457·14
4	56·891	·02540	4	·28124	4	629·97	4	·02625	4	609·52
5	71·114	·03175	5	·35155	5	787·47	5	·03281	5	761·91
6	85·337	·03810	6	·42186	6	944·96	6	·03938	6	914·29
7	99·560	·04445	7	·49217	7	1102·45	7	·04594	7	1066·67
8	113·783	·05080	8	·56248	8	1259·95	8	·05250	8	1219·05
9	128·005	·05715	9	·63279	9	1417·44	9	·05906	9	1371·43

Note.—One atmosphere is taken to be 14·7 lbs. per square inch.

Explanation.—To convert any number from one measure to the other, take the value of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus, find the number

of pounds per square inch in 32·1 kilogrammes per square centimètre (see cols. I. & II.).	of tons per square inch in 3210 kilogrammes per square centimètre (see cols. I. & III.).	of kilogrammes per square centimètre in 15 lbs. per square inch (see cols. IV. & V.).	of kilogrammes per square centimètre in 18 3 tons per square inch (see cols. VI. & VII.).	of tons per square inch in 3254 atmospheres. (see cols. VIII. & IX.).	of atmosphere in 14·6 tons per square inch (see cols. X. & XI.).
kgs. per sq. cm. = lbs per sq. in.	kgs. per sq. cm. = tons per sq. in.	lbs. per sq. in. = kgs. per sq. cm.	tons per sq. in. = kgs. per sq. cm.	atmospheres. = tons per sq. inch.	tons per sq. in. = atmospheres.
30 = 426·68	3000 = 19 05	10 = ·7031	10 = 1574 9	3000 = 19·69	10 = 1523·8
2 = 28·45	200 = 1·27	5 = ·3516	8 = 1259·95	200 = 1·31	4 = 609·5
0·1 = 1·42	10 = ·06		0·3 = 47·25	50 = ·33	0·6 = 91·4
				4 = ·03	
32·1 = 456·55	∴ 3210 = 20·38	∴ 15 = 1·0517	∴ 18·3 = 2882·10	∴ 3254 = 21·36	∴ 14·6 = 222·7

ENERGY.

Metric to English.		English to Metric.	
I. Mètre-tons.	II. Foot-tons.	III. Foot-tons.	IV. Mètre-tons.
1	3·2291	1	0·3097
2	6·4581	2	0·6194
3	9·6872	3	0·9291
4	12·9162	4	1·2388
5	16·1453	5	1·5484
6	19·3743	6	1·8581
7	22·6034	7	2·1678
8	25·8324	8	2·4775
9	29·0615	9	2·7872

1 mètre-ton is termed a "dinamode" in Italy.

Explanation.—To convert any number from one measure to the other, take the values of the different multiples of 10 by shifting the position of the decimal point, and add together. Thus find the number

of foot-tons in 4367 mètre-tons (see cols. I. & II.).	of mètre-tons in 3592 foot-tons (see cols. III. & IV.).
mètre-tons. = foot-tons.	foot-tons. = mètre-tons.
4000 = 12916·2	3000 = 929·1
300 = 968·72	500 = 154·81
60 = 193·74	90 = 27·87
7 = 22·60	2 = ·62
∴ 4367 = 14101·26	∴ 3592 = 1112·43

PERFORATION THROUGH IRON AND STEEL WITH THE FACE NOT HARDENED.

To obtain perforation through steel equivalent to a given perforation through iron, and *vice versa*.

1 inch steel = 1¼ inches iron;

that is, 4 inches steel = 5 inches iron.

Thus, given 9·4 inches perforation through iron,

$$9\cdot4 \times \frac{4}{5} = 7\cdot52 \text{ inches steel;}$$

or, given 5·2 inches steel,

$$5\cdot2 \times \frac{5}{4} = 6\cdot5 \text{ inches iron.}$$

PART IV.

STATISTICS, OFFICIAL STATEMENTS AND PAPERS.

Statement Explanatory of Navy Estimates, 1904-5.

THE Estimates for 1904-5 amount to £36,889,000, as opposed to £34,457,000 for the current year. More than half of this increase is accounted for by the fact that it is proposed to pay the whole balance still due on the 1st April in respect of the two recently-purchased battleships, formerly belonging to Chile, and to provide the ammunition for them, during the next financial year.

The rest is due to the expansion of the Fleet, affecting the charge for *matériel* and stores in Votes 8 and 9, and that for the *personnel*, especially in Votes 1 and 2 and 7; the increase also to the pay of the Army necessitates a corresponding increase to that of the Royal Marines in Votes 1 and 2; in Vote 10 there is a further large increase for interest and sinking fund in respect of the Naval Works Loan Acts.

The Board of Admiralty are well aware that the charge they are asking Parliament to sanction is a heavy one, but Parliament must remember how heavy is the responsibility cast by it on the Board of providing the country with a Navy strong enough to sustain a struggle with the navies of any two Powers, and also strong enough to ensure reasonable security to its vast sea-borne trade and to the food supply of the people.

The Board ask for nothing which they do not believe to be necessary for this purpose. They have avoided, and will avoid, giving any stimulus to the expansion of armaments by the formulation of large programmes of construction, but when such programmes are adopted by other Powers, they have no choice but to take them into account in framing their own shipbuilding policy.

Administration.

The distribution of work between the members of the Board of Admiralty has been modified with a view to simplification and to the further consolidation under each member of the Board of a definite sphere of work. The Senior Naval Lord remains as hitherto responsible for advice on naval policy, for the distribution and war organisation of the Fleet, and for its general discipline and efficiency;

the Second Naval Lord is responsible for the *personnel*, the Controller for the *matériel*, and the Junior Naval Lord for the supply of stores and the organisation of transport; the Civil Lord is responsible for the Works Department; the Financial Secretary is responsible for the finance, and the Secretary for correspondence and the management of the office.

The staff of the Naval Ordnance Department has been strengthened by the addition of an officer of the Royal Marine Artillery and additional writers.

The staff of the Naval Intelligence Department has been increased by an additional Naval Attaché, of whom there are now six, stationed respectively at Paris, Berlin, St. Petersburg, Rome, Washington, and Tôkiô; by a Commander and three Lieutenants,* Royal Navy, by an Engineer Commander, Royal Navy, by a Lieutenant-Colonel and Major, Royal Marines, and by four civil servants. This Department, the work of which is distributed between four divisions—mobilisation, war, foreign, and trade—is, as I have stated in previous memoranda, steadily developing.

It must, however, be borne in mind that, whereas map-making is one of the principal functions of a Military Intelligence Department, the very important and responsible work of making and correcting charts for the Navy is in the system of the Admiralty entrusted to a special Department, that of the Hydrographer, and that the work of that officer in all that relates to the preparation of the Navy for war is co-ordinated with that of the Director of Naval Intelligence by the real chief of the Naval Intelligence Department, the Senior Naval Lord himself.

The administrative changes reported in previous years are all working smoothly and well.

Personnel.

Two years ago I recognised my special responsibility for devising a remedy for the future for the absence from the Flag List of a due proportion of younger officers, and last year I was able to announce that the Committee presided over by Lord Goschen, which had been appointed to assist the Admiralty in the complicated and difficult question of the promotion and retirement of officers, had sent in its report. That Report has since been dealt with by the Board, and the principal recommendations made by them, which have received His Majesty's approval by Order in Council, affect the Regulations as follows:—

Admirals of the Fleet will, as at present, be retired at the age of

* To be appointed shortly as soon as available.

70. Admirals and Vice-Admirals will be retired at the age of 65, or at any age so soon as five years have elapsed since they last served as Flag Officers. Vice-Admirals are to be retired on attaining the rank of Admiral, if they have not been employed as Vice-Admiral, as at present. Rear-Admirals are to be retired at the age of 60, or at any age so soon as three and a half years have elapsed since they last served as Rear-Admiral, or, if they have not served as Rear-Admiral, so soon as three and a half years have elapsed since their promotion to the rank of Rear-Admiral, or five years since their last service as Captain has ceased. Flag Officers who have not hoisted their flags will be retired at the age of 60.

Captains are to be retired at the age of 55, or at any age if three years have elapsed since they last served as Captain, or, if they have not served as Captain, so soon as three years have elapsed since their promotion to the rank of Captain.

Commanders are to be retired at the age of 50, or at any age if three years have elapsed since they last served as Commander, or, if they have not served as Commander, since their service as Lieutenant ceased.

Lieutenants are to be retired at the age of 45, or at any age if three years have elapsed since they last served as Lieutenant, or if they have not served as Lieutenant, since their last service as Sub-Lieutenant ceased.

Flag Officers, Captains, and Commanders are to be allowed to retire at any age at the discretion of the Admiralty on the scale of retired pay provided by the Regulations. In connexion with this provision, certain improvements are to be effected in respect of the scale of retired pay for Captains.

The size of the Flag List has been fixed at 92.

These Regulations began to take effect from the 8th December, 1903, the date of His Majesty's Order in Council.

The general effect of these changes should be materially to increase the flow of promotion, but they will not, of course, affect any officer in respect of the rank in which he is now serving. An officer will, however, begin to be affected by them directly he is promoted to a rank higher than that which he at present holds. The effect of these changes on the average age of officers on the Flag List cannot be immediately operative, but in a few years they should insure that those Lieutenants and Commanders who, through their exceptional merit, receive promotion at a comparatively early age will, when they pass on to the Flag List, form a constant and larger proportion of younger Flag Officers than are at present to be found there.

It will be noticed at once that it is not proposed to change the present rule by which promotion from the Captains' List to the Flag List is by seniority and not by selection. The present system works well, and, in my opinion, a better cannot be devised so long as the principle of selection, although not applied to the promotion of Flag Officers, is applied rigorously to their employment. The question to be considered in respect of each vacancy must be which is the Flag Officer most fitted to fill the appointment. I have great sympathy for those officers who find themselves passed over by the application of this system, but the larger the Flag List the less difficult will be the position of such officers, and the good of the service is the only thing which can be considered. It cannot in any way be reckoned a reflection on an officer that he should be passed over, the number of possible appointments being smaller than the number of officers on the Flag List.

It must always be remembered that the reserve powers in the hands of the Board are ample. In the first place, the undoubted right is reserved to the Crown to select any Captain to be a Flag Officer by Order in Council quite irrespectively of his place on the Captains' List. In the second place, the Board have full discretion as to the employment of Commodores of the first and second class, and the Regulations defining their status and authority are well known. It is not, however, so generally known that by the Order in Council of the 21st November, 1855, in response to the Memorial of the Board of Admiralty of the 19th November of the same year, the Board possess full power to confer on any Naval Officer temporary or local rank, and that a Captain, being granted the temporary or local rank of Rear-Admiral under this Order in Council, would enjoy the same authority, precedence, emoluments, profits, and advantages in all respects as if he held such rank by the ordinary course of promotion in the Navy. The reason why this reserve power of the Board of Admiralty has not been more widely known is that, by some error in editing, this Order in Council was headed in the published book of Orders in Council by the words "Flag Officers," and has accordingly been held hitherto to confer on the Admiralty only the power of giving the temporary or local rank of Admiral to a Vice-Admiral or of Vice-Admiral to a Rear-Admiral. In the original document, however, no such heading appears, and there is no doubt that the real scope of the Order in Council is as I have stated.

The War Course at Greenwich has continued its work with ever-increasing value to the service. It has been settled that henceforward two complete courses will be held in each year so as to minimise as

much as possible the risk of an officer having to go to sea before his course is completed. A short course has also been established for flag officers, a commencement from which developments will undoubtedly ensue.

The question of the relative ranks of the officers of the Engineer, Medical, and Accountant branches has, I hope, been satisfactorily settled. It must be remembered that whereas all officers of these branches (except in cases of misconduct or inefficiency) receive promotion in course of time, only a proportion of Lieutenants can ever become Commanders. It is, therefore, not unjust that the average age of officers of the Engineer, Medical, and Accountant branches of the relative rank of Lieutenant should be somewhat higher than the average age of the Lieutenants themselves.

A scheme has been adopted both in connection with the Medical branch and with the Chaplains of the Navy by which young surgeons and young clergymen, who may not desire to make the Navy their permanent sphere of work, may join it for four or five years, at the end of which time they may either join the service permanently at the discretion of the Admiralty or leave it with a substantial gratuity. There is no intention of substituting temporary Chaplains or temporary Surgeons for the permanent service, but it is hoped that the permanent service may acquire a valuable supplement from a class of professional men who might not otherwise have joined it. As the scheme has only just come into operation it is too soon to say whether it is going to succeed.

Since my last memorandum was issued, Professor J. A. Ewing, F.R.S., late Professor of Applied Mechanics in the University of Cambridge, has been appointed Director of Naval Education and Vice-Chairman of the Council of Naval Education. The new scheme of entry and training of naval cadets has had the advantage of his supervision almost from the commencement, and it has been inaugurated at the New Royal Naval College at Osborne under excellent auspices. The greatest credit is due to all those who were responsible for the fact that, within nine months from the approval of the new scheme of entry and training, complete accommodation for nearly 80 cadets had been provided at Osborne, the staff had been appointed, and the cadets themselves were under training.

The Board of Admiralty are glad to take this opportunity of expressing their warm acknowledgments to H.M. Office of Works for their assistance in the matter.

I am laying before Parliament, as a separate paper, the Reports of the first two Committees of Inspection which have assisted me

in selecting candidates for nomination under the new scheme. The plan has been worked with scrupulous fairness, and has proved to be a complete success.

The gunnery of the Fleet continues steadily to improve.

During the year the changes in the system of training of the boys and men and officers of the Fleet have been matured and finally settled.

The boys in the training ships will no longer receive any instruction which is solely applicable to the management of sailing ships, and in place of the training they have hitherto received on masts and yards there has been substituted a more extensive training in gunnery and an elementary training in mechanical and stokehold work. The entry and training of boy artificers is proceeding satisfactorily.

The pay of the signalling ratings has been so improved that there is now no dearth of candidates. Proficiency in the use of mechanical tools and in stokehold work will in future form part of the examination for the rating of able seaman, and the course of training of ordinary seamen has been readjusted accordingly. A complete system of physical and gymnastic training has been introduced into the Fleet, and a new scheme for the training and organisation of naval bands has been promulgated and the work has commenced.

The system under which the gunnery and torpedo ratings and the gunnery and torpedo officers have been selected and trained has been readjusted and to a large extent reorganised.

In respect of the gunnery ratings, the object in view has been to reserve the gunnery schools for the higher gunnery ratings only, and to insure that the general gunnery training of the Fleet shall be carried on continuously in the ships at sea and in the naval barracks at the home ports.

In respect of the gunnery officers, the grades have been rearranged into three classes; of which the highest only will receive the training of scientific artillerists. The instruction of the other grades will be mainly practical. The training of navigating officers has been reorganised, and the Mercury set apart as a special instructional ship for the purpose. The Board have now under consideration a scheme for increasing the number of interpreters, and the facilities and inducements to officers of the Navy of all branches and of the Royal Marines for attaining proficiency in foreign languages.

The numbers voted for the current year were 127,000 officers and men active service ratings. Recruiting has been very satisfactory.

The increase proposed for next year is 4000, and it will consist of the following ratings and ranks:—

Officers		400
Warrant officers		4
Seamen		2437
Artisans, etc.		40
Electricians		25
Stokers		1300
Ratings raised in Australia and New Zealand		400
Marines (Naval Bands)		850
		5456
Less reduction of—		
Boys	1240	
Miscellaneous	216	
		1456
Total		4000

During the last Session of Parliament an Act was passed enabling the Board of Admiralty to make it a condition of enlistment for non-tinuous service that, after a limited period of service in the Fleet, the men so enlisted should join the Royal Fleet Reserve for the unexpired portion of 12 years.

It is certain that the full number of 625 stokers and 375 seamen proposed by the Naval Reserves Committee will have been enlisted before the end of the present financial year, and it is proposed to include the same number of non-continuous service men in the increase of next year.

The Royal Fleet Reserve shows very satisfactory progress, and already numbers 8,375 men. The Royal Naval Reserve is at length increasing in numbers, and six ships of the Apollo class have been established as sea-going drill-ships round the coast of Great Britain and Ireland. There has not been time to bring into operation all the recommendations of the Naval Reserves Committee in respect of the Royal Naval Reserves generally, or of the new class of firemen, Royal Naval Reserve, and engine-room artificers, Royal Naval Reserve, and of warrant engineers, Royal Naval Reserve, but I look forward to great progress being made with these developments next year. In respect of the officers, a considerable addition to the establishment is contemplated, and increased care is to be taken in the selection of candidates for commissions.

The Newfoundland branch of the Royal Naval Reserve is

making steady progress; and, now that the Parliaments of the Commonwealth and New Zealand have adopted the Naval Agreement, I hope that strong branches will shortly be established in Australia and New Zealand; it is hoped also shortly to establish a branch at Malta.

The Royal Naval Volunteer Reserve has made an excellent start both on the Thames and on the Clyde; in each case about 1000 men have been enrolled. Negotiations are now in progress for the establishment of divisions on the Severn, on the Forth, on the Tay, on the Mersey, on the Lower Thames, and on the east and south coast.

Last year I was able to announce that the work of the Admiral Superintendent of Reserves had been entirely severed from the command of the Home Fleet. I have now to report that that officer has received the new designation of Admiral Commanding Coast Guard and Reserves, and his office has been reorganized on a strictly naval basis. Although he has no responsibility for command of a sea-going fleet, he holds a position analogous to that of a Naval Commander-in-Chief at a home port, with a naval staff of his own and an office in London. Great Britain and Ireland have been divided into six Coast Guard districts, each under the command of a Captain living on shore, who is responsible to the Admiral Commanding Coast Guard and Reserves, or, in the case of the two Irish districts, to the senior officer on the coast of Ireland. The responsibility of the Admiral Commanding Coast Guard and Reserves includes the Royal Naval Reserve and the new Royal Naval Volunteer Reserve, in respect of which last force he is assisted by an Admiralty Volunteer Committee of which Mr. C. E. H. Chadwyck-Healey, K.C., acts as chairman.

Construction and Reconstruction and Repairs.

All the money voted for the year 1903-4 will have been earned and spent by the 31st March. The progress of the work has been satisfactory and it has been necessary also to ask Parliament to sanction a supplementary Vote for £1,308,000, of which sum, however, over half is on account of the first instalments of payment for the two battleships built for Chile which have been recently purchased. The amount proposed in the Estimates for 1904–5 for new construction is £11,654,176, of which about one million is for the completion of the purchase of the battleships mentioned above, and £642,083 will be devoted to the commencement of new ships. It had been the original intention of the Board, as announced in

Parliament, to give out the three battleships of the 1903–4 programme to contract, and to commence in the dockyards in April 1904 three battleships of the 1904–5 programme. The progress of the work in the dockyards towards the end of 1903 had, however, been so satisfactory that it became a matter of importance to commence new construction in them at as early a date as possible. It was decided, therefore, to reverse the procedure, and instead of giving out the three battleships of the 1903–4 programme to contract to commence them in the dockyards. As the preparation of the new design had not then reached that stage of completion which would have enabled the ships to have been commenced at once, and as experience has shown that four sister ships form a unit possessed of great tactical and administrative convenience, it was further decided that these battleships should be of the same design as the King Edward VII., bringing that class up to a homogeneous squadron of eight battleships or two divisions of four each. The three last battleships of this class will be called the Britannia, Hibernia, and Africa.

In February last, in answer to a question in the House of Commons as to whether the Admiralty were prepared to purchase two battleships which were being constructed in England for the Chilian Government at a cost of £2,200,000, it was stated that the question had been considered by the Board, and that it was not proposed to purchase those ships, as not being suitable for their purpose. I desire to explain shortly the meaning of this reply, and the reasons why the Board have subsequently bought these ships.

In principle it does not suit the Board to have in the Fleet one or two battleships of a special design. The tactical and administrative advantages of a homogeneous squadron are so great that the principle of modern building policy in respect of battleships is unquestionably to build in homogenous squadrons. The application of such a principle must, however, obviously be governed by the circumstances of the moment, and the price of a given ship. Under the circumstances which existed a year ago it did not seem to the Board advantageous to the country to invest £2,200,000 in these ships, but under the circumstances of the present moment it did appear to them a good bargain for the country that they should be purchased for £1,875,000. These ships have been re-named the Swiftsure and the Triumph.

The battleships of the 1904–5 programme will be given out to contract, and will be the first ships of a new design, which will be known as the Lord Nelson class.

Between the 1st April, 1903, and the 31st March, 1904, inclusive,

the following ships will have been completed and passed into the Fleet Reserve:—

6 *Battleships:* Prince of Wales, Queen, Duncan, Albemarle, Cornwallis, Exmouth.

9 *Armoured Cruisers:* Euryalus, Bedford, Berwick, Cumberland, Donegal, Essex, Lancaster, Monmouth, Suffolk.

1 *Second-class Cruiser:* Challenger.

2 *Sloops:* Cadmus, Clio.

3 *Submarines*, 11 *Destroyers*, 8 *Torpedo Boats.*

1 *Repairing Ship*, and

1 *Surveying Vessel* (purchased).

On 1st April, 1904, there will be under construction:—8 battleships, 13 armoured cruisers, 1 second-class cruiser, 4 third-class cruisers, 8 scouts, 23 destroyers, 11 submarines, 1 river gunboat, and a new Admiralty Yacht, and it is expected that between the 1st April, 1904, and the 31st March, 1905, inclusive, the following ships will have been completed and passed into the Fleet Reserve:—3 battleships, 5 armoured cruisers, 1 second-class cruiser, 4 third-class cruisers, 8 destroyers, 10 submarines, and the new yacht. It is proposed to commence during the financial year 1904–1905:—2 battleships, 4 armoured cruisers, 14 destroyers, and 10 submarines.

The purchase of the two battleships being built for Chili has necessarily modified the situation, and accordingly Parliament is asked to approve of the commencement of two new battleships instead of three, and of their commencement in the autumn instead of in April as proposed last year.

Steady progress has been made during the year with the policy of reconstruction, announced in my statement of two years ago. By the 31st March next the work will have been completed in respect of the battleships Barfleur and Centurion, and of the battleships of the Royal Sovereign class, except the Repulse, which is in hand, and the Hood, in which ship, owing to the different conditions of stability arising from the fact that she alone of the class possesses turrets, the Director of Naval Construction is not able to advise casemating the upper deck 6-in. guns. The work has been completed on the Powerful and Terrible, and on the following second class cruisers (fleet ram class): Furious, Arrogant; and Talbot class: Juno, Doris, Venus, Dido, Isis.

During the year 1904–5 it is expected that work on Gladiator and Vindictive (fleet ram class), and Eclipse, Diana, Talbot, Minerva (Talbot class) will be completed.

The policy of completing in every respect in private yards the

ships built in private yards, and of effecting repairs in private yards, has been wholly successful.

In respect of the dockyards, I think it can fairly be stated that steps have been taken in the current year which will greatly increase both their efficiency and the economy of their work. Parliament has sanctioned a loan for the purpose of an electric installation in all the dockyards which will completely furnish them both with light and power, and under a special sub-head HH. of Vote 8, Parliament is being asked to make a special provision in the years 1904–5 and 1905–6 in respect of dockyard machinery.

There is at present a good deal of obsolete machinery in the yards; the votes asked for in the two years will enable the Board to get rid of all machinery that is out of date, and to complete the equipment of the yards with machinery of the newest and most economical type.

The experiments with oil fuel have continued without a day's intermission, and I think it can be accurately stated that in no country has greater attention been given to this subject or the experiments been more exhaustive. The progress has been slow but sure; it is not a matter which can be hurried; the great difficulties connected with the satisfactory use of oil in ships of war can only be overcome by patience and continual experiment; the experience gained with the Mars and Hannibal in the Channel fleet with their cylindrical boilers has been utilised in respect of the Belleville boilers of the Bedford, which has now been commissioned for service in the Channel fleet. Simultaneously with the experiments in the use of oil fuel, the question of its storage and supply is being carefully studied.

Distribution of the Fleet.

The Parliaments of the Commonwealth of Australia and of New Zealand have sanctioned the proposals of the Colonial Conference of 1902, and the Australian Squadron will, as soon as possible, be constituted as described in the papers already laid before Parliament.

The policy of composing the squadrons or divisions of squadrons of battleships in the Home, Channel, Mediterranean and China fleets of homogeneous classes of ships has been steadily adhered to. The Home fleet will shortly be composed of four ships of the Royal Sovereign class, and of a faster division consisting of two ships of the Duncan class and the two ships recently purchased. The Channel fleet will contain eight ships of the Majestic class; and the Mediterranean fleet will include eight ships of the Formidable class, and four ships of the Duncan class. In the China fleet there will be

four battleships of the Canopus class, with the Centurion and the Barfleur.

The Cruiser Squadron consists of two ships of the Drake class and four of the Monmouth class. In addition, two armoured cruisers are attached to each of the Home, Channel, Mediterranean and China fleets, and one to the Australian Squadron.

The Commander-in-Chief of the Home fleet has been given complete and continuous command of the Home destroyer flotillas, and an additional Rear-Admiral has been appointed to the Mediterranean fleet.

I append the usual statement of the work done in the past year by the various departments of the Admiralty.

SELBORNE.

February 1, 1904.

STATEMENT OF WORK, 1903–4, Etc.

Changes in the Composition of Fleets.

Mediterranean.

The most important changes have occurred in the Battleship Squadron. Great progress has been made in the direction of homogeneity by the substitution of the six * vessels of the Duncan class for the Canopus, Ramillies, Repulse, Renown, Cæsar and Victorious, vessels of no less than four different types. The Illustrious will shortly be withdrawn without relief in order to form part of the enlarged Channel fleet, and the Mediterranean fleet will then consist of 12 ships representing only two different classes, in three divisions of four, with a Flag Officer at the head of each.

The second-class cruisers Gladiator and Vindictive have been relieved by the Arrogant and Furious, vessels of the same type, but rendered more powerful by their recent re-armament.

The third-class cruiser Mohawk has been detached temporarily for service on the Somali coast.

It is intended to effect a redistribution of the torpedo boats on the Station, the most modern boats being concentrated at Gibraltar, while the remainder are attached to Malta.

The Leander has been reconstructed as a sea-going depôt ship for torpedo-boat destroyers, and has proceeded to the Station in order to take up her new duties in conjunction with the Tyne.

The sailing sloop Cruiser has been withdrawn from duty as training ship for ordinary seamen.

North America.

The Hotspur is to be sold, and her place as port guard ship at Bermuda is to be taken by the Rupert, a similar vessel, but considerably larger and fitted with more modern engines and guns.

The North American Squadron is at present cruising in the West Indies in company with the Cruiser Squadron.

It has recently been found necessary to detach the two sloops Fantome and Alert to patrol the Venezuelan coast for the protection of British interests.

* Two of these will shortly be transferred to the Home fleet in place of the Benbow and Anson, and will be replaced in the Mediterranean by the Queen and Prince of Wales (Formidable class). The fleet will thus be composed as stated on page 88.

South Atlantic.

The new station, whose establishment was decided on in 1902–3, came into existence on August 1. It includes the old South-East Coast of America Station and the West Coast of Africa Division of the Cape of Good Hope Station. A detachment composed of the Blanche, third-class cruiser, the Beagle, sloop, and the shallow draft gunboats, Dwarf and Thistle, was transferred to the new command from the Cape Station, and the Squadron has since been strengthened by the substitution of the third class cruiser Tartar for the composite sloop Nymphe, and of the second-class cruiser Brilliant for the Blanche. The flagship Cambrian, second-class cruiser, will shortly be relieved by the St. George, a first-class cruiser.

Pacific.

The Squadron being considered too small to form a rear-admiral's command, Rear-Admiral A. K. Bickford, C.M.G., has been relieved by Commodore J. E. C. Goodrich, M.V.O. The cruiser Amphion has been relieved by the Bonaventure.

The torpedo-boat destroyers Virago and Sparrowhawk have been transferred to the China Station.

On December 3 the Flora ran ashore at Union Bay, British Columbia, but though at one time in a dangerous position, she was towed off and safely docked without suffering serious damage.

Cape.

No change of any importance has been made in the Squadron except, as already stated, the transfer of four ships to reinforce the newly-created South Atlantic Station.

Since August 1, 1903, the Station limits have included the Islands of Madagascar, Mauritius, and Seychelles, which formerly lay within the limits of the East Indies command, but have been reduced by the transfer of the West Coast of Africa Division to the South Atlantic Station.

East Indies.

The agreement with the Indian Government for manning the Indian Harbour Defences has now been determined, and the Assaye, first-class torpedo gunboat, and the torpedo boats 101, 104, 105 and 106 have been withdrawn from Indian waters and have arrived in England.

Operations have been conducted in conjunction with the Italian Squadron on the Station to prevent the smuggling of arms into Somaliland.

H.M.S. Argonaut, while on her way back to China, was attached temporarily to the East Indies Station in order to form an escort for the Viceroy of Indian during his visit to the Persian Gulf.

China.

The Squadron has been reinforced by the Centurion, first-class battleship; and the Vengeance, first-class battleship, has been transferred from the Mediterranean to the China Station; the Goliath, first-class battleship, returning to England on relief by the Vengeance. The Argonaut, first-class cruiser, has been relieved by the armoured cruiser Leviathan, and the first-class cruiser Blenheim is shortly to be relieved by the first-class cruiser Andromeda. The second-class cruiser Pique has been relieved by the Sirius, a ship of the same class. With the addition of the Sparrowhawk and Virago (transferred from the Pacific Station) there are now nine torpedo-boat destroyers on the China Station, of which four are in commission and five in reserve at Hong Kong. The Mutine, sloop, has been transferred to the Australian Station.

Australia.

The conclusion of the new Naval Agreement with Australia and New Zealand has necessitated considerable changes in the composition of the Squadron, some of which have already taken place, whilst others will be effected in the near future. Prior to the agreement the naval force on the Station consisted of one first-class cruiser, eight third-class cruisers (including two in reserve), one sloop and four gunboats (including one in reserve). Under the new agreement the Squadron is ultimately to comprise not less than one armoured cruiser, first-class, two second-class cruisers (including one in reserve), four third-class cruisers (three being drill ships), and four sloops. The three vessels used as drill ships and one other vessel will be manned by Colonials as far as procurable, and will be officered by officers of the Royal Navy, supplemented by officers of the Royal Naval Reserve.

The three third-class cruisers Tauranga, Katoomba, and Mildura have been formally commissioned as drill ships, and their naval crews will be reduced as Colonials enter; the place of the Katoomba as guardship at Sydney being taken by the Wallaroo. The Archer, third class cruiser, has been relieved by the third-class cruiser Psyche.

The Karrakatta, torpedo gunboat, has been withdrawn from the Station on relief by the Mutine, sloop, transferred from China. The first-class armoured cruiser Euryalus has been commissioned to replace the first-class cruiser Royal Arthur as flagship. The Clio, sloop, has been commissioned to relieve the Sparrow, gunboat, and the Lizard, gunboat, will shortly be relieved by the Cadmus, sloop. The further changes in the composition of the Squadron will be eventually completed by the arrival of two new second-class cruisers on the Station.

The Station is now, and will in future be, a Vice-Admiral's command.

Cruiser Squadron.

The Medea and Medusa, third-class cruisers, have been withdrawn from the Squadron. The Minerva, second-class cruiser, has been relieved by the first-class armoured cruiser Berwick, and the Brilliant and Rainbow, second-class cruisers, have been relieved by the first-class armoured cruisers Kent and Donegal respectively. The place of the second-class cruiser Hyacinth, which was withdrawn from the Squadron early last year, has now been taken by the first-class armoured cruiser Monmouth. The Squadron thus comprises six 23-knot armoured cruisers, of which two are of the Drake and four are of the Monmouth class.

Channel Fleet.

The Majestic and Magnificent, first-class battleships, which have been attached to the Channel fleet since December, 1895, are to be relieved early in February by two sister ships, the Cæsar and Victorious, and will rejoin the Channel fleet in May next after refit, thus bringing up the number of battleships to eight (all of Majestic class). The Hogue, first-class armoured cruiser, and the Furious, second-class cruiser, have been relieved by the first-class armoured cruiser Bedford and the second-class cruiser Hermes respectively. The Hermes is at present carrying out trials under the superintendence of the Boiler Committee.

Home Fleet, etc.

In May last important changes were introduced affecting the organisation both of the Home fleet and of the Coast Guard Service on shore. The Coast Guard District Ships, which hitherto had only been able to be in company with the four ships of the Home

Squadron during the periodical cruises, were relieved of their shore duties and have since been permanently attached to the Flag of the Commander-in-Chief of the Home fleet. The Coast Guard Service and the Reserves were at the same time placed under the control of a Flag Officer distinct from the Commander-in-Chief, Home fleet, and known as the Admiral Commanding Coast Guard and Reserves. The Coast Guard Service was distributed over six Coast Guard Districts—three in England, one in Scotland, and two in Ireland, each under the command of a District Captain responsible to the A.C.R.; and to each district a second-class cruiser of the Apollo type was attached as a Drill Ship for R.N.R. The sea training of R.N.R. men is still carried out in Home fleet ships, some of which are sent periodically to the several districts for the embarkation and disembarkation of men who are entering upon or have completed their period of training. The various ships employed on Fishery service are under the orders of the A.C.R., but such as can be spared from their fishery duties are lent to the Home fleet from time to time for purposes of drills and exercises.

The Senior Officer on the coast of Ireland acts as Deputy to the A.C.R. for Coast Guard duties in Ireland.

The following changes have been made in the composition of the Home fleet:—

The Resolution, first-class battleship, has been relieved by the Edgar, first-class cruiser, and has subsequently herself replaced the Sans Pareil.

The Camperdown and Collingwood, first-class battleships, have been relieved respectively by the Hawke, first-class cruiser, and the Hood, first-class battleship.

Destroyer Organisation.

The three flotillas of torpedo boat destroyers on the Home Station have been placed in charge of a captain acting under the orders of the Commander-in-Chief, Home fleet, and the office of Inspecting Captain of Torpedo Boat Destroyers has been abolished. The flotillas will still be worked from the ports where their depôt ships are moored. It is intended to transfer the Portsmouth flotilla to Portland as soon as suitable mooring arrangements can be made at the latter port and the Invincible is ready to assume the duties of depôt ship to the flotilla. The depôt ship Audacious has been transferred to Felixstowe, which will be the headquarters of the Medway flotilla.

Home Ports.

The Thames has taken the place of the Latona as depôt ship for submarine boats.

At Devonport the Impregnable has taken the place of the Téméraire as flagship of the Commander-in-Chief.

The sailing brigs used in the training service have been withdrawn.

The Aurora, first-class cruiser, has been commissioned as additional sea-going tender to the Britannia at Dartmouth.

Manœuvres.

In August last the bulk of the Mediterranean, Home and Channel fleets, and Cruiser Squadron, together with a number of other ships specially commissioned, or completed, took part in fleet manœuvres in the Atlantic. The manœuvres were followed by a series of tactical exercises. At the same time all available torpedo craft, with cruisers and special service vessels on the Home Station were engaged in manœuvres off the coast of Ireland.

Personnel.

The measures necessary for carrying out the new scheme of entry and training of naval officers, to which reference was made in the last annual statement, have been proceeded with during the year.

The Royal Naval College at Osborne has been established and equipped for its work, and in September last the college was opened for the reception of the first entry of cadets.

Further steps have been taken to improve the general training of engineer cadets, and the course of studies at the Royal Naval Engineering College has been revised.

Orders have been given for the carrying out afloat of the system of training of seamen in mechanical and stokehold work.

The new system of training for boys has been introduced, and is now being carried out in all the stationary training establishments. The Iris has been commissioned as a tender to these establishments for the purpose of carrying out such parts of the training for which a sea-going ship is essential, and the Medea and Medusa, when their present trials have been completed, will be similarly detailed for the same duty.

The new system of training in the gunnery and torpedo schools and in the naval barracks has been established at all the Home ports,

and full instructions have been issued as to the various courses of instruction through which the men have to pass.

New rates of allowances have been introduced in connection with the new system of qualification in gunnery and torpedo, with the object of giving better pay to the more highly skilled gunners or best shots.

The courses for lieutenants qualifying in gunnery and torpedo have been revised with the object of giving greater prominence to the practical part of the courses, while reserving the college course for the more scientific and highly qualified officers.

A civilian expert in physics, etc., has been appointed to assist the staffs of the gunnery and torpedo schools at Portsmouth, where his assistance has been found of great value.

Changes have been introduced in the selection, training, and advancement of navigating officers of the Royal Navy. A navigation school ship has been established at Portsmouth with a suitable staff of instructors, and the school will have a position similar to that of the gunnery and torpedo schools.

A tender has been attached to the school ship Mercury for the purpose of extending the training of officers in Coast Navigation.

The training of boy artificers has now been established at each of the Home ports, and some 180 boys are now undergoing instruction in the Fleet Reserves.

Steps have been taken to establish the ratings of mechanician, yeoman of stores, and engineer's writer, and it is expected that these ratings will prove a valuable adjunct to the staff of the engine room.

Effect has been given to the proposal for the establishment of the new rank of chief artificer engineer, and a limited number of promotions have been made.

Steps have also been taken for the promotion of a proportion of officers from the lists of chief gunners, chief boatswains, chief signal boatswains, and chief carpenters to the rank of lieutenant, Royal Navy, and two chief artificer engineers will be advanced so soon as they have been one year in their new grade.

The pay of signal ratings has been improved with the object of encouraging a larger number of men to qualify for the higher standard in signalling.

Chief petty officers have been granted an addition to their rates of pension of ½*d.* a day for each year's service in chief petty rank, subsequent to the completion of their first period of continuous service.

Provision has been made for the award of a gratuity on discharge

to seamen and marines holding a conspicuous gallantry medal in cases where an annuity is not payable.

The rank of paymaster-in-chief on the active list has been established for accountant officers. Paymasters-in-chief so promoted will have relative rank with captains, Royal Navy.

Directions have been given for the instruction of certain officers and ranks and ratings in the principles of first aid to the injured.

Considerable progress has been made in giving effect to the recommendations of Sir E. Grey's committee on the naval reserves.

A scheme for the organisation of Royal Marine volunteers is being worked out by the volunteer committee, and it is hoped that good progress will be made with the scheme by the coming summer.

Regulations for the entry of non-continuous service seamen and stokers have been laid down, and a commencement made in enlisting men. The entries so far (9th January, 1904), viz., 261 seamen and 328 stokers, justify the expectation that the full 1000 voted will be reached by the end of the financial year. The reports upon these men from ships in which they have been embarked are completely satisfactory.

The trial made last summer and autumn in the training of bank clerks as a reserve of accountant officers was on the whole satisfactory, and steps are now being taken to organise a reserve of such accountants as a distinct branch of officers of the Royal Naval Reserve.

Steps are being taken to extend among medical men, both at home and in the colonies, a knowledge of the conditions under which the services of civil practitioners will be accepted in time of war. A limited number of names have been already enrolled at home, and the response from the Australasian Colonies has been sufficient to show that the feeling there is favourable and that a fair number of volunteers may be expected.

The scheme for the establishment of a sick berth attendants' reserve has not so far attracted the number of volunteers which the Admiralty had reason to expect. Some 170 volunteers have been enrolled up to the present time.

THE ROYAL MARINES.

A School of Music for the training of Bandsmen for service afloat has been established with temporary headquarters at the R.M. Artillery Division at Eastney. The new class of bandsmen and boys are enlisted as Marines under the same conditions as other men and boys of the corps, but with rates of pay special to themselves.

The pay and allowances of warrant officers, non-commissioned officers and men have recently been the subject of much consideration, and arrangements have been made to adjust the same to a scale somewhat similar to that approved for the Army, certain increases being made dependent upon improved efficiency, having due regard to the conditions of service in the corps. They will come into force on 1st April, 1904.

During the year 6261 Marines passed the course of musketry afloat under naval conditions, about 14 per cent. qualifying as marksmen. There were 3095 trained Marines exercised on shore under the new Army Regulations, of whom 6 per cent. qualified as marksmen—the latter small percentage being due to the more stringent conditions of the new course instituted in April, 1903.

NAVAL RESERVES.

It is proposed to increase the *personnel* of the Coast Guard from 4237 to 4303. This increase includes provision for the new district captains and their clerical staffs. The remainder are required for new signal stations, which are to be kept manned in peace time, and for wireless telegraph work.

In order to ensure that the men who will work the war signal stations shall have constant practice in peace time, an agreement has been made with Lloyd's by which the commercial maritime signalling carried out by Lloyd's will be transferred to the Coast Guard at twenty-one signal stations.

This work is now being done at fourteen stations, and at the remaining seven it will be transferred when Lloyd's have provided the necessary houses for the Coast Guard crews.

It is also proposed to carry out commercial wireless telegraphy for Lloyd's at certain stations, practice being even more important in this branch of signalling than in visual work.

It is proposed to increase the number of executive officers from 1550 to 1600 during the coming financial year.

Two hundred and ninety-two qualified candidates are on the lists of applicants for appointment.

The numbers now undergoing naval training in H.M. ships are:—

	Lieuts.	Sub-Lieuts.	Mids.	Total.
Twelve months' training .	26	52	21	99
Gun and Torpedo courses .	13	11	8	32

Three hundred and twenty-three officers on the active list have already undergone this training, and are in receipt of training fees.

The establishment of commissioned engineer officers is fixed at 400, and there are now borne:—

Senior Engineers	71
Engineers	199
Assistant Engineers	111
	381

There are 100 qualified candidates on the list of applicants for appointment, but it is not proposed to fill any of the above vacancies except by exceptionally desirable candidates, owing to the recent introduction of a new rank of warrant engineer, for 180 of whom provision is made in the Estimates.

The following officers have completed or are undergoing courses at the dockyards:—

Senior Engineers	25
Engineers	78
Assistant Engineers	28
	131

Royal Naval Reserve Men.

The numbers borne on December 31 as compared with those voted for 1903–4 and former years are:—

Class.	Voted.	Borne.		
	1903-4.	31.12.03.	31.12.02.	31.12.01.
Qualified seamen	11,300	5,173	4,298	3,485
1st class (old system) . . .		6,020	6,472	7,106
Seamen	10,500	6,374	5,572	4,973
2nd class (old system) . . .		3,900	4,273	5,063
Firemen	4,200	4,540	4,033	3,714
Totals	26,000	26,007	24,648	24,341

1522 qualified seamen and seamen have been embarked in H.M. ships for naval training during the year 1903, as against 1207 in the preceding year.

The rating of engine-room artificer, Royal Naval Reserve, has been instituted, and engineers of the mercantile marine and engineering yards are eligible for enrolment under certain conditions. They are required to undergo naval training to the same extent as the

warrant engineers, R.N.R., and will also receive annual retainers and pensions. The rating of leading seamen has been established.

A special class of firemen, R.N.R. (to be drawn from stokers in gas and electric light factories and other works), was instituted during the year. An annual retainer is payable to these men on completing satisfactorily a term of three months' training on board H.M. ships, and six months' further service, together with fourteen days' drill annually in other years, will entitle them to a life pension.

The new rank of commander, R.N.R., has been established.

Greenwich Hospital.

Benefits of Greenwich Hospital.—The scale of pensions provided from Greenwich Hospital funds for the widows of seamen and marines killed or drowned on duty has been improved, and it now corresponds with that for which provision is made from naval funds for the widows of men whose death is brought about by warlike operations.

The additional cost (at present about £2000 a year) is borne by naval funds.

Landed Estates.—The committee appointed to inquire into the condition of the property at Greenwich having furnished their report, and its main features having been approved by the Board, the recommendations of the committee are being acted upon as opportunity permits.

The unfavourable weather in the summer and autumn of last year caused much damage to the corn crops on the northern estates ; to mitigate the loss to the tenants which was caused thereby, an abatement of rent was granted at the last audit in the case of the arable farms varying from 10 to 15 per cent., according to circumstances. There are not any farms in hand.

School.—The high standard of excellence attained by the Royal Hospital School at Greenwich is fully maintained, and in his report for the past year H.M. Inspector stated that "the instruction is sound and thorough, and the order is very good." The maximum grant was earned for the period.

Ordnance.

The amount asked for is £3,646,000, as against £3,206,100 voted for 1903–4, or an increase of £439,900. Of this, £400,000 is provision for the purchased ships Triumph and Swiftsure.

Guns and Mountings.—During the year 1903–4 progress in gun

manufacture and supply has been satisfactory. All requirements for re-armaments and new construction have been fully met.

Good progress in the development of guns of higher power has been made, and new designs of several natures are being manufactured.

The question of working B.L. guns at higher chamber pressures is being considered, and an experimental 9·2-inch B.L. gun of new design is under manufacture, in which the chamber pressure will be 20 tons per square inch.

The introduction of the improved form of cordite (M.D.) is being steadily proceeded with. This propellant is calculated to improve the ballistics of our guns generally (both new and existing designs), while adding to the "life" of the gun.

Further experiments with "capped" projectiles have resulted in the adoption of a reliable capped projectile for some of the new guns and in the capping of certain existing projectiles.

The efforts which have been made for some years to provide a reserve of war munitions adequate for any emergency were not relaxed during the past year, and the stock is considered to be sufficient to meet all requirements at the outbreak and during the earlier stages of a war and also until the great manufacturing resources of the country would enable us to replenish the stock. This condition is facilitated by that policy which is being steadily pursued of the Admiralty procuring, storing and retaining complete control over, the supplies of Ordnance Stores required by the Fleet.

The reserves of mountings are in a satisfactory state, and further necessary accommodation for them is being provided.

Re-armaments.

In Merchant Cruiser Armaments 5-in. B.L. have been replaced by 4·7-in. Q.F. at home, and 1-in. Nordenfelts by 3-prs. at home and abroad.

Progress has been made in re-arming Royal Naval Reserve Drill Ships and Batteries with converted guns with mechanism of latest pattern. It is hoped that the whole scheme of re-armament will be completed in 1905–6.

Instructional Armaments, etc.

In connexion with the new scheme of Gunnery Training, various additions to and alterations in the armament of the batteries at the several Royal Naval Barracks have been found necessary. These

have already been provided for, for the most part by loan of guns, etc., from reserves. Amounts for replacements where necessary have been inserted in the 1904–5 Estimates.

A great improvement has been made in instructional appliances for teaching accurate firing. The general supply of these is well advanced and is being proceeded with.

Ordnance Depôts.

The separation of Naval and Military Stores at depôts abroad cannot be effected rapidly owing to the many questions involved, but a committee at Hong Kong has made definite recommendations for the separation of Naval and Military Ordnance Stores and the Naval Ordnance Establishment at Bermuda has been separated from the Army Ordnance Department.

The question of Ordnance Store accommodation at home, and its most advantageous distribution, is also receiving attention, and in view of the future importance of Rosyth in the Firth of Forth, it will be necessary to provide in that locality for this essential portion of a warship's equipment. The magazines at Lodge Hill (Chatham) are now practically complete and in use. It has been decided to add to this establishment a laboratory for manufacture, repair and examination of cartridges, etc.

An agreement has been made with the Marconi Company which has enabled a great advance to be made in the service. A general reorganisation of the system is contemplated throughout the service.

The Ariadne from Portsmouth Torpedo School is being prepared as a school for Sheerness, to train all the higher torpedo ratings in the Nore command.

Coaling of the Fleet.

The construction of the large floating coal depôt, fitted with rapid working transporters, is nearing completion, and delivery is to be made at one of the Home ports at an early date.

Considerable improvements in the coaling facilities afloat have been effected by the addition of craft fitted with the latest appliances, and further additions are provided for in the Estimates for 1904–1905.

Experiments are still in progress with apparatus for coaling His Majesty's ships at sea, and certain trials will be continued in 1904–1905.

The building up of the reserve stocks of patent fuel at home and abroad is being continued.

Three old gunboats have been converted into tank vessels for storing oil fuel at the Home ports, and further provision has been made for increasing the accommodation and facilities afloat for supplying this fuel to ships whose furnaces have been fitted for its use.

New Construction.

The Vote for New Construction during 1903–4 is greater than in any preceding year. The work on the ships in hand has made good progress.

In accordance with the arrangements made last year, all the ships now being built by contract are to be entirely completed for passing into Fleet Reserve before acceptance from contractors.

The three armoured cruisers, Donegal, Berwick, and Cumberland, have already been delivered complete under this arrangement. We have also had the torpedo boat destroyer Itchen delivered complete for passing into Fleet Reserve under the same arrangement.

The experience gained by this procedure fully establishes the advantage of the policy adopted in taking this action. The organisation of the Staff necessary to give full effect to this procedure has been the subject of much discussion, and the arrangements made have been found in practice to work very efficiently.

Some important trials have been in progress for some months past with regard to the resistance of vessels at high speeds so far as it is affected by (*a*) depth of water; (*b*) different kinds of compositions for coating the bottom.

Battleships.

The battleships of the Duncan class, ordered under previous programmes, have all been completed and commissioned.

Of the eight vessels of the Formidable class, six are complete and in commission, the two remaining, viz., the Queen and Prince of Wales, will be completed next month.

The five vessels of the King Edward VII. class, ordered previous to 1903–4, have made good progress.

The three battleships intended to have been laid down by contract during the present financial year have been ordered to be built in the Royal Dockyards. They have been named Africa, Britannia, and Hibernia.

First-Class Armoured Cruisers.

Six vessels of the Kent class have been completed, and nine of them have successfully passed their steam trials. In all those cases where the vessels have been tried in deep water and with the new

pattern screw, speeds considerably exceeding the designed speed of 23 knots have been obtained. It is, in fact, now known that these vessels can attain a smooth water speed of 23 knots when carrying the whole of their coal, over 1700 tons, and all other stores.

As the 7·5 gun which the Devonshire class carry is a new one, it has been necessary to work out suitable arrangements of gun mountings and appliances for stowing, working, and hoisting ammunition to the guns. It has also been necessary to work out the question of a more satisfactory hoist for 6 in. guns, and a new hoist of continuous type is now under trial.

In all the vessels of this class there are being fitted revised arrangements for the removal of ashes by means of ejectors on the See system.

Since the first two vessels of the Duke of Edinburgh class were ordered, substantial additions to their armament have been made. A stern torpedo tube has been fitted firing right aft on the centre line, and 6-in. and 50-calibre guns have been arranged for instead of those of existing pattern. This has involved working out modified arrangements of gunports and armour.

Three of the four armoured cruisers provided in the present year's programme have been ordered by contract, and have been named Achilles, Cochrane, and Natal; the fourth has been ordered to be built at Pembroke and has been named Warrior.

Third-Class Cruisers.

It has been decided not to proceed with the three third-class cruisers provided for in the original programme.

Scouts.

The four Scouts provided for in the current programme have been ordered by contract, one from each of the builders of the first four Scouts. The second four Scouts have been named as follows:— Attentive, Foresight, Patrol, and Skirmisher.

Torpedo Boat Destroyers.

The 15 Destroyers in programme of 1903–4 are repeats of those ordered in the previous year, with the exception of a modification in the position of the forward 6-pr. guns. Orders for these have been placed by contract.

The 19 Destroyers building at the beginning of the financial year will shortly be ready for Commission.

Submarines.

Orders for nine out of the ten Submarine Boats provided for in this year's programme have been placed. These are similar to A Class already building. A special design is being prepared for the tenth boat, and the order for this boat will shortly be placed. Six of those ordered previously have been delivered.

Coast Guard Cruisers.

The two Coast Guard Cruisers provided for in this year's programme are of new types, designs for which have been prepared at the Admiralty.

Surveying Ship.

The Steam Yacht Consuelo has been purchased for this service, and renamed Sealark.

Armour.

There is now no difficulty in obtaining supplies of armour to promptly meet the needs of ships building. A very large sum is needed each year to meet expenditure on armour; the expenditure this year will probably reach about £1,810,000. Continued satisfactory trials have been made to ascertain that the quality of supplies from the armour-plate makers was equal to the contract conditions. The possibility of obtaining improved qualities of armour has been kept in view. Some trials in connection with this subject have already been made, and further trials are in contemplation.

MACHINERY AND BOILERS.

Of the Torpedo Gunboats, which are being re-engined and reboilered with small tube water-tube boilers, associated with light quick-running engines, the Jason, Circe, and Leda have successfully completed their trials. The Halcyon will be completed early next year.

New water-tube boilers have now been fitted in fourteen First-Class Torpedo Boats. New water-tube boilers have been obtained or will shortly be obtained by contract for twelve other First-Class Torpedo Boats, in addition to new water-tube boilers for ten other boats, which are being made at the Dockyards.

The policy adopted last year of fitting a combination of one-fifth cylindrical and four-fifths water-tube boilers in Battleships and First-

Class Cruisers has been continued, the new Battleships of the 1903–4 programme of the King Edward VII. class being fitted with four-fifths Babcock & Wilcox boilers, and the four new Cruisers of the Duke of Edinburgh class with four-fifths Yarrow (large tube) boilers. The cylindrical and Yarrow boilers are in all cases fitted with closed stokehold system of draught. The Yarrow boilers for the Dockyard built ship of the Duke of Edinburgh class (Warrior) will be made by Messrs. Yarrow.

The Hermes has been re-boilered with Babcock & Wilcox boilers, and has successfully carried out contractor's steam trials. A series of trials under the direction of the Boiler Committee have been already carried out, but before the contemplated trial to Gibraltar and back a further series of trials will be made to compare two systems of furnace gas baffling in this type of boiler, as well as a trial with new propellers shortly to be fitted, to increase the propulsive efficiency.

The comparative trials under the direction of the Boiler Committee between the Medea fitted with Yarrow (large tube) boilers and the Medusa fitted with "Dürr" boilers have been continued during the year, including the trial to Gibraltar and back, but complete records to enable comparison to be made between these two types of boilers have not yet been received from the Boiler Committee. All these three ships, the Hermes, Medea, and Medusa, took part in this year's manœuvres.

The Spartiate and Europa, each ship fitted with Belleville boilers with economisers, have made trips to China and back with relief crews for ships on that station, and the opportunity was taken to run these ships under various trial conditions and at high speeds. Satisfactory results were obtained.

The Hyacinth and Minerva during this year repeated the comparative trial runs to Gibraltar and back under similar conditions to those trials which had been previously carried out under the direction of the Boiler Committee, and the information obtained has been of much value.

The automatic forced lubricating arrangements fitted for main engines in Syren continue to work satisfactorily, and two of the new torpedo boat destroyers will be so fitted.

Turbine Propelling Machinery.

The Velox, fitted with turbine machinery, and also with small reciprocating engines for use at low speeds, has completed her contractor's trials, and is now at Portsmouth, and will shortly carry out a further series of experimental trials.

One of the new Third-Class Protected Cruisers (the Amethyst) and a Destroyer (the Eden) are being fitted with turbine machinery, with auxiliary turbines for use at low speeds. Valuable experience will shortly be obtained on the trials of these vessels.

Liquid Fuel.

The experiments with liquid fuel have been continued, and much valuable information has been gained. In the Battleships Mars and Hannibal, many of the difficulties connected with the installations in these ships have been overcome as the result of practical experience at sea, and they are to have their oil-burning system extended. When this work is complete all their boilers will be capable of burning either oil and coal or coal alone.

The cruiser Bedford has had part of her boilers fitted to burn oil and coal or coal alone, and is now in commission. The destroyer Spiteful is having all her boilers fitted to burn liquid fuel. As the manipulation of liquid fuel fittings requires much skill in order to ensure the best results, several boilers of different types are being purchased and fitted up at Portsmouth in order that the various problems connected with liquid fuel and water-tube boilers may be more effectively studied, and instruction given to the engine-room ratings of the Fleet.

The progress which is being made in internal combustion engines is being closely watched, and experiments will be made to determine whether this type of engine, which possesses advantages in fuel economy, can be adapted to the needs of the service.

Standardisation.

The policy of standardising the machinery of war vessels has been carried out in the six First-Class Cruisers of the Duke of Edinburgh Class, and has been effected with some of the water-tube boilers and the principal pipe connections.

In other vessels, the system of causing all the auxiliary machinery of similar vessels ordered at the same time to be identical and interchangeable is still pursued.

Large Repairs during 1903–4 at the Home Dockyards and by Contract.

The following ships have been or will be completed:—By dockyards: Andromeda, Arrogant, Audacious (*a*), Barfleur (*c*), Bonaven-

(*a*) = Base for Destroyers. (*c*) = Casemating, etc.

ture, Brilliant, Cæsar (e), Centurion, Furious, Hood (a), Invincible, Juno, Leander (b), Proserpine, Ramillies (e), Resolution, Royal Sovereign (e), Satellite (c), Tartar, Theseus, Thrush, Victorious, Wild Swan (c). By contract: Astræa, Aurora, Circe (d), Colossus, Endymion, Hecla, Hermes, Howe, Jason (d), Leda (d), Niobe, Pelorus, Psyche, Maine, Crescent, St. George, Terrible (e), Halcyon (d).

The following have been or will be commenced during 1903–4, and will be completed in 1904–5:—By dockyards: Barham, Magnificent, Majestic, Minerva, Nile, Philomel, Repulse, Rodney, Trafalgar. By contract: Argonaut, Canopus, Goliath, Glory (at Hong Kong), Highflyer.

The details of the repairs and refits proposed to be carried out in 1904–5 appear in the Appendix to the Navy Estimates, but the principal refits to be dealt with in 1904–5 are given below:—By dockyards: Anson, Ariadne (old), Barracouta, Benbow, Blenheim, Cambrian, Camperdown, Collingwood, Cressy, Diana, Eclipse, Royal Arthur, Sans Pareil, Sutlej, Talbot, Edgar, Gibraltar, Gladiator, Hannibal, Hawke, Jupiter, Mars, Naiad, Nymphe, Prince George, Renown, Thunderer, Vindictive. By contract: Pique, Rainbow, Triumph (old) *, Warrior.

NEW WORKS.

Works Provided in Estimates.

Chatham.—The Mould Loft has been rebuilt. The Fleet Reserve Workshop, extension of Electrical Shop, and extension of Store for tubes for Water Tube Boilers will be completed in 1904–5.

Sheerness.—The extension of Boiler Shop will be completed in 1903–4. The Drainage Improvements will be finished in 1904–5.

Portsmouth.—The new Pumping Station for Docks 7 and 10, new Chain Cable Store, and the extension of No. 13 Dock are expected to be completed in 1904–5; and considerable progress will also be made towards the completion of the new Steam Factory.

Devonport.—The railway lines round Main Storehouses, and the Caisson for No. 2 Dock will be finished during 1904–5.

Portland.—Berthing for Torpedo Boat Destroyers has already been commenced, and considerable progress will be made with this work in 1904–5, in which year the three new Official Residences and new Canteen will be well advanced.

(a) = Base for Destroyers. (b) = Sea-going Base for Destroyers. (c) = Drill Ship (R.N.R.). (d) = Re-engining. (e) = Casemating, etc.

* To equip ship to undertake slight repairs to Torpedo Boat Destroyers.

Malta.—The work of renewing Wharf Walls in French Creek is progressing. Buildings are being provided for use in connection with the Hydraulic Dock purchased this financial year.

Hong Kong.—The new Gun Mounting Store will be practically finished in 1903–4.

Dredging.—The important Dredging at Bermuda is practically completed. A Dredger is being sent to Wei Hai Wei to continue the dredging necessary there.

Victualling Yards.—The Slaughterhouse at Chatham, the Cold Meat Store at Gibraltar, and the adaptation of War Department property for Victualling purposes at Malta will practically all be completed in 1904–5.

The Slaughterhouse at Malta has been completed.

Coaling Depôts.—A Store for patent fuel at Mauritius will be erected during 1904–5.

Hospitals.—The new block at Haslar for Officer patients, and important alterations and additions at Jamaica are expected to be completed in 1904–5.

Training Colleges.—The main buildings of the Cadets' College at Osborne will be completed during 1904–5. Accommodation is being provided on shore for Boys of Training Establishments at Shotley and Queensferry.

The principal new Works in 1904–5 are :—

Chatham.—Additional workshops, Fleet Reserve. Residence for Commander-in-Chief.

Portsmouth.—Accommodation and storage for Submarines. Workshop for Fleet Reserve.

Devonport.—Railways—North and South Yards. New jetty and railways between Nos. 2 and 3 Slips—South Yard.

Deal.—New church.

Hong Kong.—Torpedo range.

Sydney.—Additional accommodation and victualling store.

Progress under the Naval Works Loan Acts.

Enclosure and Defence of Harbours.

Gibraltar.—The Admiralty Mole Extension and the Detached Mole are completed, except the heads of the Moles, where the batteries and lighthouses, etc., are still in hand.

The dredging of the harbour is well advanced, and a large area has been dredged to the required depth.

The Commercial Mole is nearly completed, and will be brought into use in a few months' time.

Portland.—The new breakwaters enclosing the harbour are completed, except certain work on the heads, which is still in progress.

Dover.—Admiralty Pier Extension.—The foundation course has now reached the head at the far end of the work, being a distance of 1948 ft. from the original head of the Pier.

East Reclamation is completed, except a short length of coping.

East Arm of Breakwater.—The foundation course has been laid for a length of 2842 ft., the low-water course for 2625 ft., and the work completed, except parapet, for a length of 2542 ft.

Malta Breakwater.—Much progress has been made under the contract for the construction of Ricasoli and St. Elmo Breakwaters.

Adapting Naval Ports, etc.

Keyham Dockyard Extension.—Graving Dock No. 4.—Complete with the exception of the upper parts of the Caisson Camber. The erection of the Caisson is rapidly advancing.

Graving Dock No. 5.—Complete with the exception of the upper parts of the Caisson Cambers. The erection of the Caisson at North end has made good progress, and the one at the South end is well in hand.

Graving Dock No. 6.—Complete with the exception of the Entrances, and the upper part of the Caisson Cambers.

Entrance Lock.—The East Wall has been built to a height of 5 ft. below coping. The West Wall has been built to the underside of coping, except a short length at the North End. The North Caisson Camber is built to within 15 ft. of coping, and the South Camber to within 17 ft. of coping.

Closed Basin.—About 1,370,000 cubic yards of mud have been excavated and removed.

Tidal Basin.—The enclosing walls are well in hand, and about 7000 cubic yards of mud have been removed.

Outer Wall of Main Works.—All the Columns have been sunk for the foundations and a length of about 1950 ft. of Wharf Wall has been completed.

The Pumping Station and machinery have been erected.

Gibraltar Dockyard Extension.—A large portion of the Shops and Store Buildings are completed and in use.

No. 3 Dock is practically completed, except the Caisson, which is still in hand.

Nos. 1 and 2 Docks are being rapidly advanced.

The Pumping Station and Machinery have been erected.

Hong Kong Dockyard Extension.—The Reclamation in front of the Naval Yard and War Department properties is making good progress. The Wharf Walls of the New Basin are in hand. The excavation for the Dock is nearly completed.

Simon's Bay Dockyard Extension.—The Breakwater and the Walls enclosing the New Basin have been commenced.

Malta Dockyard Extension.—Progress on the two new Docks being built by contract has not been very satisfactory. More of the subsidiary works have been completed, and others are well in hand.

Bermuda Dockyard Extension.—About 300 feet of the foundations for Wharf Wall are completed. The mass work and horizontal blockwork on western arm are completed except coping. About 5000 of the large concrete blocks have been made.

Chatham Dockyard Extension.—The contract for the New River Wall, Upnor Entrance, has been let and the work has already been commenced. Arrangements are being made for the provision of extensive railway facilities.

Sheerness Depôt for Torpedo Boat Destroyers.—The site for the extension of Nos. 4 and 5 Docks is being cleared. The sites for the Electric Shop, Mast Shed, Torpedo Tube Store, etc., are being prepared.

Deepening Harbours and Approaches.

At Portsmouth the outer and inner bars and the approach channel are completed. Eleven berths have been dredged and two others are nearly finished. Of the cruiser berths in Fountain Lake one group of three is completed and another group is one-third done.

At Devonport the dredging above Saltash Bridge is practically completed. The area is now being swept over to remove shoal patches. The work below Saltash Bridge has been commenced.

Chatham Dock.—The construction of the Dock is practically completed. The foundations for Machinery Shop are finished and the Contract for the superstructure has been let.

Coaling Facilities.

Gibraltar.—The Coal Island, commenced last year, is progressing satisfactorily.

Kowloon.—The Briquette Factory has been taken over and the construction of the Breakwater and Coaling Jetty is in hand.

Steps are being taken to cover in a considerable proportion of the Coal Yards at Malta.

Property has been acquired for the establishment of a Coaling Depôt at Devonport.

Coaling accommodation is being provided at Wei Hai Wei.

Arrangements are being made for the early commencement of a Coaling Depôt at Ascension.

Naval Barracks, etc.

Chatham Naval Barracks.—The Barracks were completed and occupied on the 30th April 1903. Certain additional works which have been sanctioned are in progress.

Portsmouth Naval Barracks.—The Barracks were completed and occupied in September 1903.

Chatham Naval Hospital.—All the buildings are making good progress, and the new Hospital will be completed and occupied by the end of the year.

Magazines.—Gibraltar.—The Magazines at the back of the Ragged Staff are in hand, and a large amount of excavation has been carried out in the rock.

The work incidental to the original Scheme has been well advanced, but it has been found necessary to amplify that Scheme in view of the increased requirements of the Fleet.

Further laboratory accommodation is being provided, and the system of railway communications greatly extended at Chatham, whilst extensive further arrangements are being made to meet additional requirements, principally at Naval Stations abroad.

Coast Guard and Royal Naval Reserve Batteries.—Good progress has been made in acquiring sites for new Coast Guard Stations and Royal Naval Reserve Batteries. In many cases contracts have been let and the works are proceeding.

Torpedo Ranges.—At Portsmouth the extension of the Horsea Island Range is expected to be commenced very shortly. The arrangements for the construction of a new Torpedo Range at another Port are under consideration.

Electric Light and Power in Naval Establishments.—The contract has been let for the Electric Generating Station at Pembroke, and the work is now in hand.

At Chatham, Devonport, and Portsmouth, preliminary arrangements have been made and contracts will be let shortly. At Malta, work has commenced in clearing site, and contract for the Chimney Shaft is about to be let. Contract for the building will follow shortly. In the cases of all the smaller Naval Establishments for which there is provision for Electric Light in the current Naval Works Loan Act, drawings are now practically completed and tenders will be called for within a few months.

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February 1st, 1904.

Abstract of Navy Estimates for 1904–1905.

Votes.		Estimates, 1904–1905. Gross Estimate.	Appropriations in Aid.	Net Estimate.	Estimates, 1903–1904. Gross Estimate.	Appropriations in Aid.	Net Estimate.	Difference on Net Estimates. Increase.	Decrease.	Votes.
	I.—Numbers.			Total Numbers.			Total Numbers.	Numbers.	Numbers.	
A.	Total Number of Officers, Seamen, Boys, Coast Guard, and Royal Marines	131,100	....	131,100	127,100	....	127,100	4,000	....	A.
	II.—Effective Services.	£	£	£	£	£	£	£	£	
1	Wages, &c., of Officers, Seamen and Boys, Coast Guard, and Royal Marines	6,825,143	134,143	6,691,000	6,445,828	133,028	6,312,800	378,200	....	1
2	Victualling and Clothing for the Navy	2,952,085	524,085	2,428,000	2,805,240	512,740	2,292,500	135,500	....	2
3	Medical Establishments and Services	314,970	21,970	293,000	280,942	21,942	259,000	34,000	....	3
4	Martial Law	15,626	126	15,500	15,698	198	15,500	....	....	4
5	Educational Services	199,340	45,340	154,000	152,316	36,216	116,100	37,900	....	5
6	Scientific Services	92,722	20,122	72,600	89,584	20,184	69,400	3,200	....	6
7	Royal Naval Reserves	412,679	8,179	404,500	305,681	8,181	297,500	107,000	....	7
8	Shipbuilding, Repairs, Maintenance, &c.:									8
	Section I.—*Personnel*	3,065,800	21,600	3,044,200	3,013,400	21,600	2,991,800	52,400	....	Sec. I.
	Section II.—*Matériel*	5,419,900	357,100	5,062,800	5,103,800	317,100	4,786,700	276,100	....	Sec. II.
	Section III.—Contract Work	10,446,000	132,000	10,314,000	9,703,500	132,000	9,571,500	742,500	....	Sec. III.
9	Naval Armaments	3,734,000	38,000	3,646,000	3,300,964	94,864	3,206,100	439,900	....	9
10	Works, Buildings, and Repairs at Home and Abroad	1,663,200	29,000	1,634,200	1,527,000	25,000	1,502,000	132,200	....	10
11	Miscellaneous Effective Services	458,538	14,538	444,000	423,638	14,138	409,500	34,500	....	11
12	Admiralty Office	336,400	9,000	327,400	315,400	9,000	306,400	21,000	....	12
	Total Effective Services . . . £	35,936,403	1,405,203	34,531,200	33,482,991	1,346,191	32,136,800	2,394,400	....	
	III.—Non-Effective Services.									
13	Half-Pay, Reserved, and Retired Pay	809,086	12,886	796,200	797,194	12,894	784,300	11,900	....	13
14	Naval and Marine Pensions, Gratuities, and Compassionate Allowances	1,228,601	19,801	1,208,800	1,206,089	19,789	1,186,300	22,500	....	14
15	Civil Pensions and Gratuities	353,748	448	353,300	350,567	467	350,100	3,200	....	15
	Total Non-Effective Services . . £	2,391,435	33,135	2,358,300	2,353,850	33,150	2,320,700	37,600	....	
	Grand Total . . . . £	38,327,838	1,438,338	36,889,500	35,836,841	1,379,341	34,457,500	2,432,000	....	

Net Increase £2,432,000

STATEMENT of the Principal Points of DIFFERENCE between the ESTIMATES of 1903–1904 and those for 1904–1905.

INCREASES.		£
Wages, &c., of Officers, Seamen, and Marines		387,200
Victualling and Clothing		135,500
Medical Establishments and Services		34,000
Educational Services		28,900
Scientific Services		3,200
Royal Naval Reserves		107,000
Wages of Artificers and Police in Dockyards		40,134
Naval Stores		305,800
Propelling Machinery for His Majesty's Ships and Vessels (Contract)		130,793
Hulls of Ships (Contract)		622,211
Gun Mountings (Contract)		277,374
Machinery for His Majesty's Shore Establishments (Contract)		111,693
Guns		290,400
Projectiles and Ammunition		124,300
Small Arms, Maintenance of Naval Ordnance Vessels, &c.		20,100
Inspection, Proof, Experiments, &c. (Naval Ordnance Stores)		4,400
Decrease in amount of Receipts arising from the Sale of unserviceable Naval Ordnance Stores		6,600
Works, Buildings, and Repairs		131,065
Miscellaneous Effective Services		39,735
Non-Effective Services		37,600
Miscellaneous Increases		33,566
		£2,871,571
DECREASES.	£	
Auxiliary Machinery for His Majesty's Ships and Vessels (Contract)	74,308	
Purchase of Ships, Vessels, &c.	12,000	
Repairs and Alterations by Contract of Ships, &c.	309,250	
Royal Reserve of Merchant Cruisers	4,013	
Torpedoes and Gun-cotton	5,000	
Increase in amount of Receipts arising from the Sale of Old Ships and unserviceable Naval Stores and Machinery.	35,000	
		439,571
Net Increase		£2,432,000

STATEMENT showing the Total Estimated EXPENDITURE for the NAVAL SERVICE, including Amounts provided in the NAVY ESTIMATES, as well as in the CIVIL SERVICE and other ESTIMATES, for the following Services:—

———		1904–1905.	1903–1904.
NAVY ESTIMATES:		£	£
Estimated Expenditure (after deducting Appropriations in Aid) . .		36,889,500	34,457,500
CIVIL SERVICE ESTIMATES:			
Estimated Expenditure under—			
Class I. Vote 8.—Public Buildings, Great Britain:	£		
Maintenance and Repairs, including New Works, Alterations, &c.	10,185		
Rents, Insurance, Tithes, &c. . .	11,215		
Fuel, Light, Water, &c. . . .	5,000		
Furniture	5,350		
	———	31,750	25,350
Class I. Vote 9.—Surveys of the United Kingdom		200	200
„ I. „ 12.—Rates on Government Property		115,300	105,000
„ I. „ 13.—Public Works and Buildings, Ireland:			
Coast Guard, viz.:	£		
Purchase of Sites . . .	—		
New Works and Alterations, including Naval Reserve Stations .	10,599		
Maintenance and Supplies . .	6,844		
	£17,443		
Naval Reserve, viz.:			
Maintenance and Supplies . .	188		
	———	17,631	16,956
Class II. Vote 8.—Board of Trade:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		3,737	3,598
„ II. „ 9.—Mercantile Marine Services:			
Staff and Incidental Expenses in connection with the Royal Naval Reserve Force . . .		4,000	2,450
„ II. „ 14.—Exchequer and Audit Department (Cost of Audit):	£		
Navy Cash Accounts . . .	8,800		
Expense and Manufacturing Accounts	4,800		
Store Accounts	5,400		
	———	19,000	19,500
Class II. Vote 23.—Stationery and Printing		91,000	79,000
„ III. „ 1.—Law Charges, England		6,388	6,357
Maintenance of Naval Prisoners:			
„ III. „ 7.—Prisons, England and the Colonies . . .		4,831	5,816
„ III. „ 13.—Prisons, Scotland		120	150
„ III. „ 20.—Prisons, Ireland		392	392
REVENUE DEPARTMENT ESTIMATES:			
Vote 1.—Customs.—Percentage for provision of funds for District Paymasters of the Coast Guard		126	131
Vote 1.—Customs.—Staff and Incidental Expenses in connection with the Royal Naval Reserve Force		3,300	3,311
Vote 2.—Inland Revenue.—Analysis of Food, &c.		165	140
Vote 3.—Post Office.—Postage of Official Correspondence (including Parcels)	£ 17,820		
Vote 5.—Post Office Telegraphs.—Official Telegrams and Expenses in connection with Telegraphs (Admiralty Wires, and Services of Clerks)	19,250		
	———	37,070	33,784
Total	£	37,224,510	34,759,635

Note.—In addition to the Services shown above, an annuity of £16,243 18*s.* is payable to the Commissioners of Woods, &c., from the Consolidated Fund, under the Public Offices Sites Act of 1882 (45 & 46 Vict. c. 32).

STATEMENT showing the CONTRIBUTIONS from INDIA and the COLONIES towards NAVAL EXPENDITURE.

RECEIVED FROM.	NATURE OF SERVICE.	VOTE.													TOTAL.
		1	2	3	7	8			9	11	12	13	14	15	
						Section I.	Section II.	Section III.							
		£	£	£	£	£	£	£	£	£	£	£	£	£	£
India	Maintenance of His Majesty's Ships in Indian Waters . .	28,000	9,100	500	..	12,500	10,200	13,000	11,600	2,500	..	4,300	8,300	..	100,000
	Indian Troop Service (on account of work performed by the Admiralty) . . .	..	..	..	..	..	..	..	..	..	3,050	..	..	350	3,400
Australian Commonwealth	Maintenance of an Australasian Squadron and the establishment of a branch of the Royal Naval Reserve	58,000	18,300	600	5,000	..	30,700	95,000	5,500	7,000	..	8,500	11,400	..	200,000
New Zealand .															40,000
Cape Colony . .	General maintenance of the Navy . .	11,100	4,600	..	..	4,900	9,100	14,100	6,200	..	..	..	..	..	50,000
Natal		7,700	3,200	..	..	3,400	6,400	9,900	4,400	..	..	..	..	..	35,000
Newfoundland .	Maintenance of a branch of the Royal Naval Reserve . .	..	..	..	3,000	..	..	..	..	..	..	..	..	..	3,000
	Total . . £	104,800	35,200	1,100	8,000	20,800	56,400	132,000	27,700	9,500	3,050	12,800	19,700	350	431,400

VOTE (A).

NUMBERS of OFFICERS, SEAMEN, BOYS, and ROYAL MARINES Borne on the Books of His Majesty's Ships, and at the ROYAL MARINE DIVISIONS.

One Hundred and Thirty-one Thousand One Hundred.

I.—SEA SERVICE.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1904–1905.		1903–1904.		Numbers of all Ranks borne on 1st January, 1904.
Vote 1	FOR HIS MAJESTY'S FLEET:					
	Flag Officers	20		20		
	Commissioned Officers	4,342		4,152		
	Subordinate Officers	812		770		
	Warrant Officers	1,730		1,734		
	Petty Officers and Seamen	86,680		83,009		
	Boys (Service)	3,400	96,984	3,700	93,385	93,666
	COAST GUARD:					
	Commissioned Officers	95		89		
	Chief Officers of Stations	244		242		
	Petty Officers and Seamen	3,964	4,303	3,906	4,237	4,160
	ROYAL MARINES (for Service Afloat and on Shore):					
	Commissioned Officers	468		474		
	Warrant Officers	37		32		
	Staff Sergeants and Sergeants	1,459		1,417		
	Buglers and Musicians	995		647		
	Rank and File	17,019		17,010		
	Band Boys	400	(a) 20,378		19,580	19,583
	Total		121,665		117,202	117,409

Net Increase 4,463

(a) Including 12 officers, Sub-Head II.

VOTE (A.)—*continued*.

II.—OTHER SERVICES.

Under which Vote Provided.	RANKS, &c.	NUMBERS, ALL RANKS. 1904–1905.		1903–1904.		Numbers of all Ranks borne on 1st January, 1904.
Vote 1	Naval Cadets	585		440		
Vote 1	Engineer Cadets	149		172		
Vote 1	Pensioners in Home Ships and in the Reserves, &c.	932		813		
Vote 1	Boys under Training— Seaman Class	5,000		6,200		
Vote 1	Artificer	360	(b) 7,026		7,625	7,013
Vote 2	For Victualling and Clothing for the Navy	57		58		
Vote 3	For Medical Establishments and Services	601		544		
Vote 4	For Martial Law	24		29		
Vote 5	For Educational Services	460		269		
Vote 6	For Scientific Services	8		6		
Vote 8	For Shipbuilding, Repairs, Maintenance, &c.:					
	Section I.	748		831		
	Section II.	28		70		
	Section III.	66		64		
Vote 9	For Naval Armaments	253		256		
Vote 10	For Works, Buildings, and Repairs, at Home and Abroad	105		105		
Vote 11	For Miscellaneous Effective Services	1		1		
Vote 12	For Admiralty Office	58	2,409	40	2,273	2,251
	Total		(c) 9,435		9,898	9,264
	Net Decrease		463			
	Total, Sea Service	121,665		117,202		
	„ other Services	9,435	131,100	9,898	127,100	
	Net Increase		4,000			

(*b*) Including 11 officers, Sub-Head H.

(*c*) Including		1904–1905		1903–1904
(*c*) Including	Officers and Seamen	2,302	..	1,999
„	Pensioners (Vote 1)	921	..	802
„	Pensioners (other Votes)	18	..	15
„	Boys (Training, Seaman C'ass)	5,000	..	6,200
„	Boys (Training, Artificer)	360	..	..
„	Boys (Training, Artizan)	556	..	656
„	Royal Marines	278	..	224
		9,435	..	9,898

VOTE 8.

SHIPBUILDING, REPAIRS, MAINTENANCE, &c.

I.—ESTIMATE of the SUM which will be required, in the YEAR ending 31st March, 1905, to defray the EXPENSES of SHIPBUILDING, REPAIRS, MAINTENANCE, &c., including the COST of ESTABLISHMENTS of DOCKYARDS and NAVAL YARDS at HOME and ABROAD.

DOCKYARD WORK.

SECTION I.—PERSONNEL.—Three Million and Forty-four Thousand Two Hundred Pounds.
(£3,044,200.)

SECTION II.—MATÉRIEL.—Five Million and Sixty-two Thousand Eight Hundred Pounds.
(£5,062,800.)

CONTRACT WORK.

SECTION III.—CONTRACT WORK.—Ten Million Three Hundred and Fourteen Thousand Pounds.
(£10,314,000.)

II.—SUB-HEADS under which SECTION I., PERSONNEL, of this VOTE will be accounted for.

—	ESTIMATES.		Increase	Decrease.
	1904–1905.	1903-1904.		
	£	£	£	£
DOCKYARD WORK.				
SECTION I.—PERSONNEL.				
Dockyards at Home.				
A.—Salaries and Allowances . . .	(a) 208,506	203,154	5,352	..
B.—Wages, &c., of Men, and hire of Teams	2,328,432	2,312,036	16,396	..
C.—Wages, &c., of Police Force . .	46,250	45,048	1,202	..
D.—Contingencies	2,200	2,200	..	..
Naval Yards Abroad.				
E.—Salaries and Allowances . . .	(a) 103,098	96,184	6,914	..
F.—Wages, &c., of Men, and hire of Teams	357,609	335,144	22,465	..
G.—Wages, &c., of Police Force . .	18,905	18,834	71	..
H.—Contingencies	800	800	..	..
£	3,065,800	3,013,400	52,400	..
Deduct,—				
I.—Appropriations in Aid . . .	21,600	21,600	..	..
£	3,044,200	2,991,800	52,400	..
		Net Increase .	. £52,400	

(a) These amounts include the sums of £32,443 and £11,091 for pay of Inspectors of Trades at Home and Abroad respectively, which is charged direct to the cost of shipbuilding.

Note.—Provision has been made for New Construction in the above Vote to the extent of—

	£
Section 1	837,500
„ 2	1,447,051
„ 3	9,369,625
	£11,654,176

The details of the total anticipated Expenditure on New Construction will be found on page 444.

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION II., MATÉRIEL, of this VOTE will be accounted for.

———	ESTIMATES. 1904–1905.	ESTIMATES. 1903–1904.	Increase.	Decrease.
	£	£	£	£
DOCKYARD WORK—*continued.*				
SECTION II.—MATÉRIEL.				
Naval Stores, &c.				
A.—Timber, Masts, Deals, &c.	158,000	163,000	..	5,000
B.—Metals and Metal Articles	1,749,500	1,469,900	279,600	..
C.—Coals for Yard purposes	101,000	116,500	..	15,500
D.—Hemp, Canvas, &c.	250,500	263,000	..	12,500
E.—Paint Materials, Oils, Pitch, Tar, Tallow, Boats, Furniture, and other Miscellaneous Articles	789,500	761,500	28,000	..
F.—Electrical, Torpedo, and other Apparatus	394,700	347,500	47,200	..
G.—Freight	75,000	80,000	..	5,000
H.—Rents, Water, &c., Dockyards at Home, and Naval Yards Abroad	43,400	39,900	3,500	..
I.—Gas, &c., Dockyards at Home and Naval Yards Abroad	19,300	18,500	800	..
Coals for the Fleet.				
K.—Coals, &c., for the Fleet	1,839,000	1,844,000	..	5,000
£	5,419,900	5,103,800	359,100	43,000
Deduct—				
L.—Appropriations in Aid	357,100	317,100	40,000	..
£	5,062,800	4,786,700	319,100	43,000
	Net Increase		£276,100	

VOTE 8.—SHIPBUILDING, REPAIRS, MAINTENANCE, &c.—*continued.*

II.—SUB-HEADS under which SECTION III., CONTRACT WORK, of this VOTE will be accounted for.

———	ESTIMATES.		Increase.	Decrease.
	1904–1905.	1903–1904.		
	£	£	£	£
SECTION III.—CONTRACT WORK.				
A.—Propelling Machinery for His Majesty's Ships and Vessels	3,569,914	3,439,121	130,793	..
B.—Auxiliary Machinery for His Majesty's Ships and Vessels	93,735	168,043	..	74,308
C.—Hulls of Ships, &c., Building by Contract	4,293,847	3,671,636	622,211	..
D.—Purchase of Ships, Vessels, &c.	..	12,000	..	12,000
E.—Repairs and Alterations by Contract of Ships, &c., and their Machinery and Stores	413,000	722,250	..	309,250
F.—Inspection of Contract Work	70,000	70,000	..	..
G.—Gun Mountings and Air-Compressing Machinery	1,631,704	1,354,330	277,374	..
H.—Machinery for His Majesty's Shore Establishments at Home and Abroad	200,000	188,307	11,693	..
H.H.—Replacement of Machinery for His Majesty's Shore Establishments	100,000	..	100,000	..
I.—Royal Reserve of Merchant Cruisers.	73,800	77,813	..	4,013
£	10,446,000	9,703,500	1,142,071	399,571
Deduct—				
K.—Appropriations in Aid	132,000	132,000	..	..
£	10,314,000	9,571,500	1,142,071	399,571
	Net Increase		£742,500	

PROGRAMME of the ESTIMATED EXPENDITURE in CASH, and in NET
REPAIRS, MAINTENANCE, &c.,
(Exclusive of the FLEET

SUB-HEADS under which this ESTIMATED EXPENDITURE will be
provisions of Section 1 (2), ARMY

	ESTIMATED EXPENDITURE IN				
	Direct Expenditure.				
	Dockyard Work.		Contract Work, Sec. III.	Total Direct Expenditure. (A)	
	Personnel, Sec. I.	Matériel, Sec. II.			
	£	£	£	£	
NEW CONSTRUCTION:					
A.—DOCKYARD-BUILT SHIPS—					
Hulls, &c. (*c*)	775,900	(*f*) 1,385,301	655,464	2,816,665	1
Machinery	30,800	10,000	823,307	864,107	2
	806,700	1,395,301	1,478,771	3,680,772	3
B.—CONTRACT-BUILT SHIPS—					
Hulls, &c. (*c*)	29,500	50,450	(*g*) 5,241,378	5,321,328	4
Machinery	..	..	2,625,456	2,625,456	5
	29,500	50,450	7,866,834	7,946,784	6
C.—SMALL VESSELS (*d*)	1,300	1,300	24,020	26,620	7
TOTAL NEW CONSTRUCTION	837,500	1,447,051	9,369,625	(*e*) 11,654,176	8
D.—RE-CONSTRUCTION, REPAIRS, ALTERATIONS, &c.	1,248,520	664,930	651,395	2,564,845	9
E.—SEA STORES, &c.	..	1,009,880	26,940	1,036,820	10
F.—ESTABLISHMENT, INCIDENTAL, AND MISCELLANEOUS CHARGES, UNAPPROPRIATED	..	..	..	..	11
TOTAL . . £	2,086,020	3,121,861	10,047,960	15,255,841	12

(*c*) Including Hydraulic and Transferable Gun Mountings, &c.
(*d*) Including Harbour Craft, and excluding Torpedo Boats, &c., the value of which is included under other Sub-Heads.
(*e*) Exclusive of £20,400 provided under Vote 2 for new Tank Vessels and Lighters for Victualling Yard Service; also £11,000 provided under Vote 9 for new Vessels for Naval Ordnance Store Service, and £67,500 for Coaling Craft, Vote 8, Section 2, Sub-Head K.
(*f*) Including £906,051 for Armour.　　(*g*) Including £741,455 for Armour.

VALUES OF STORES issued for SHIPBUILDING, RE-CONSTRUCTION, in the Year 1904–1905.
COALING SERVICE.)
accounted for in the NAVY EXPENSE ACCOUNTS, under the AND NAVY AUDIT ACT, 1889.

	1904–1905.		EXPENDITURE AS ESTIMATED IN NAVY ESTIMATES, 1903–1904.			Difference between Direct Expenditure, 1903–1904 (B) and 1904–1905 (A).	
	Establishment, &c., Charges, apportioned.	Aggregate. 1904–1905	Direct Expenditure. (B)	Establishment, &c., Charges, apportioned.	Aggregate, 1903–1904.	Increase.	Decrease.
	£	£	£	£	£	£	£
1	302,854	3,119,519	(h) 2,356,635	247,530	2,604,165	460,030	..
2	20,560	884,667	735,246	20,420	755,666	128,861	..
3	323,414	4,004,186	3,091,881	267,950	3,359,831	588,891	..
4	83,978	5,405,306	(i) 4,456,160	97,410	4,553,570	865,168	..
5	35,872	2,661,328	2,577,839	38,760	2,616,599	47,617	..
6	119,850	8,066,634	7,033,999	136,170	7,170,169	912,785	..
7	652	27,272	10,550	220	10,770	16,070	..
8	443,916	12,098,092	10,136,430	404,340	10,540,770	1,517,746	..
9	321,474	2,886,319	(k) 2,856,008	300,000	3,156,008	..	291,163
10	65,730	1,102,550	1,063,186	84,300	1,147,486	..	26,366
	831,120			788,640			
11	1,731,246	1,731,246	..	1,609,883	1,609,883	..	..
12	2,562,366	17,818,207	14,055,624	2,398,523	16,454,147	..	..

NET INCREASE ON DIRECT EXPENDITURE . . £1,200,217.

(h) Including £568,000 for Armour.
(i) Including £1,110,000 for Armour.
(k) Including £45,000 for Armour.

RECAPITULATION OF ESTIMATED EXPENDITURE.

SUB-HEADS OF EXPENDITURE.			A., B., and C.	D.			E.	F.		
DOCKYARD WORK—	£	£	£	£	£	£	£	£	£	£
Section I.—*Personnel* . .	2,086,020	1,158,231	997,134	—	698,976	698,585	40,724	495,940	312,892	3,244,251
Section II.—*Matériel* . .	3,121,861	895,527	1,603,316	—	382,481	448,091	1,034,886	347,653	390,886	4,017,388
CONTRACT WORK—										
Section III.	10,047,960	508,608	9,497,642	—	347,524	310,662	26,940	161,575	22,300	10,556,568
Total Estimated Expenditure for 1904–1905	15,255,841	2,562,366	12,098,092	—	1,428,981	1,457,338	1,102,550	1,005,168	726,078	17,818,207
Totals of Sub-Heads £	**17,818,207**		**12,098,092**	**2,886,319**			**1,102,550**	**1,731,246**		**17,818,207**

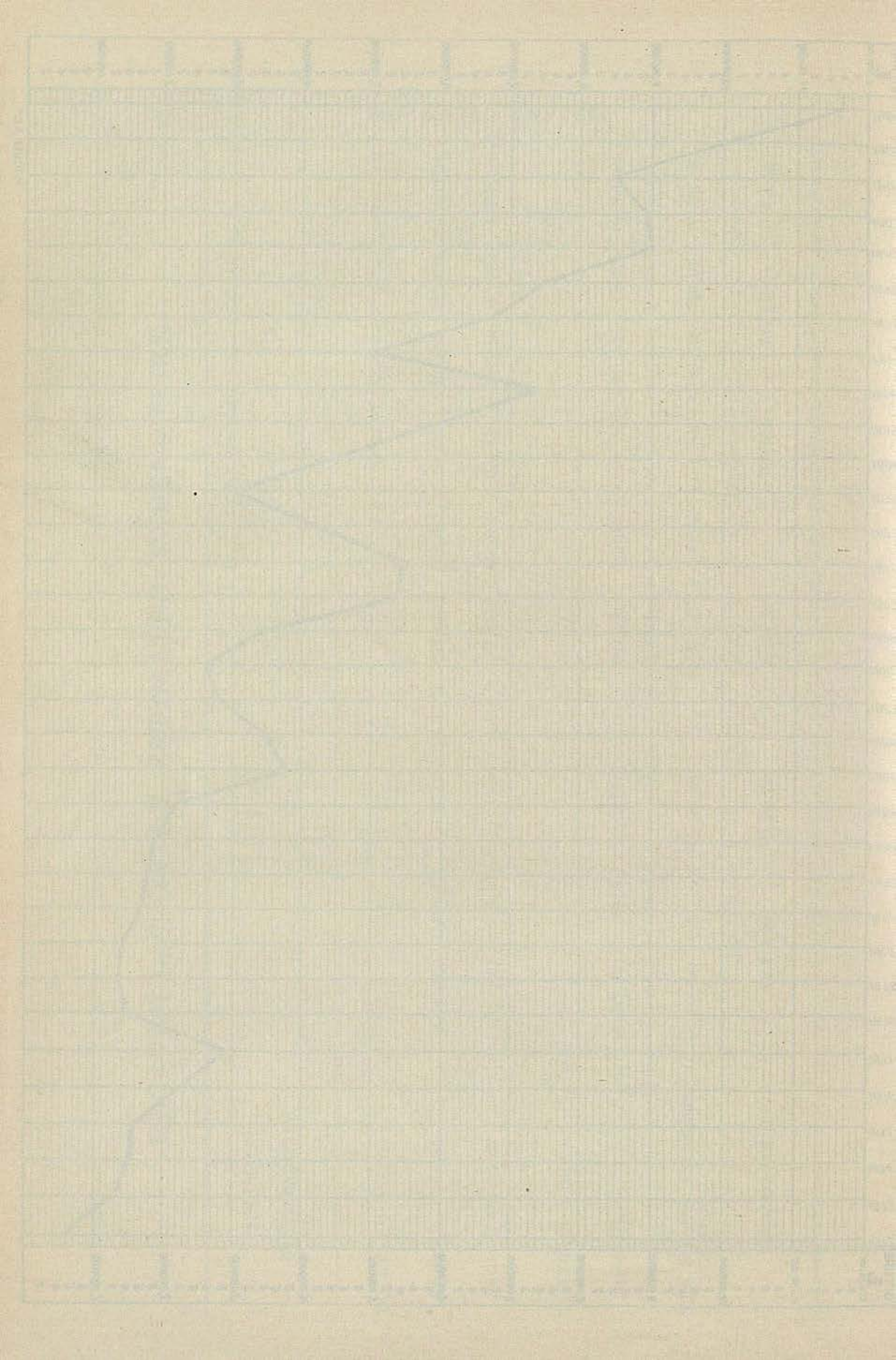
DIAGRAM SHEWING THE EXPENDITURE UPON THE CONSTRUCTION OF NEW SHIPS. DURING THE 33 YEARS BETWEEN 1872-73. & 1904-5.

EXPENDITURE £

1872-3, 1873-4, 1874-5, 1875-6, 1876-7, 1877-8, 1878-9, 1879-80, 1880-1, 1881-2, 1882-3, 1883-4, 1884-5, 1885-6, 1886-7, 1887-8, 1888-9, 1889-90, 1890-1, 1891-2, 1892-3, 1893-4, 1894-5, 1895-6, 1896-7, 1897-8, 1898-9, 1899-0, 1900-1, 1901-2, 1902-3, 1903-4, 1904-5

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1,000,000
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2

PITCHER & Co



LIST of NEW SHIPS and VESSELS Estimated to be Passed into the FLEET RESERVE during the Years 1904–1905 and 1903–1904.

1904–1905.				1903–1904.			
NAME OF SHIP.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.	NAME OF SHIP.	Load Displacement in Tons.	Indicated Horse Power.	Number of Guns.
ARMOURED SHIPS.				**ARMOURED SHIPS.**			
King Edward VII. .	16,350	*18,000	18	Queen	15,000	15,000	16
Commonwealth . .	16,350	18,000	18	Prince of Wales. .	15,000	15,000	16
Hindustan . . .	16,350	*18,000	18	Albemarle . . .	14,000	18,000	16
Swiftsure	11,800	*12,500	18	Montagu. . . .	14,000	18,000	16
Triumph	(about) 11,800	*12,500	18	Duncan	14,000	18,000	16
Hampshire . . .	(about) 10,850	*21,000	12	Cornwallis . . .	14,000	18,000	16
Roxburgh	10,850	*21,000	12	Exmouth . . .	14,000	18,000	16
Antrim	10,850	*21,000	12	Euryalus . . .	12,000	21,000	14
Carnarvon . . .	10,850	*21,000	12	Monmouth . . .	9,800	22,000	14
Cornwall	9,800	22,000	14	Bedford	9,800	22,000	14
				Kent	9,800	22,000	14
				Essex	9,800	22,000	14
				Suffolk	9,800	22,000	14
				Berwick	9,800	22,000	14
				Cumberland . . .	9,800	22,000	14
				Donegal	9,800	22,000	14
				Lancaster . . .	9,800	22,000	14
PROTECTED SHIPS.				**PROTECTED SHIPS.**			
Encounter . . .	5,880	12,500	11	Challenger . . .	5,880	12,500	11
Amethyst	3,000	*9,800	12				
Topaze	3,000	*9,800	12				
Diamond	3,000	*9,800	12				
Sapphire	3,000	*9,800	12				
UNPROTECTED SHIPS.				**UNPROTECTED SHIPS.**			
Enchantress . . .	3,190	*6,000	..	Assistance . . .	9,600	*4,000	..
Coast Guard Cruiser, No. 1	230	300	..	Cadmus	1,070	1,400	6
Ditto. No. 2	380	*650	..	Clio	1,070	1,400	6
Widgeon	195	*800	2	Scalark	900	550	..
TORPEDO BOAT DESTROYERS 10	various			TORPEDO BOAT DESTROYERS. 9	various		..
TORPEDO BOATS . 4	..	..	..	TORPEDO BOATS . 4	..	..	..
SUBMARINE BOATS 11	..	..	..	SUBMARINE BOATS 3	..	..	..

* Forced draught.

NAVAL WORKS ACTS, 1895, 1896, 1897, 1899 AND 1901.

ACCOUNT for the Period ended 31st March, 1903.

I.—STATEMENT showing the Sum issued to the Admiralty, and the Expenditure.

	Year in which issued.	Amount. £ s. d.		Amount. £ s. d.
Issued to the Admiralty out of an authorised issue of £13,521,000*	1895–96	860,000 0 0	Expenditure between 1st April, 1895, and 31st March, 1903, as detailed in Statement III., column 6	12,911,612 9 9
	1896–97	898,000 0 0		
	1897–98	596,000 0 0		
	1898–99	1,080,000 0 0		
	1899–1900	1,460,000 0 0		
	1900–1901	2,135,000 0 0		
	1901–1902	2,906,000 0 0		
	1902–1903	3,148,000 0 0	Balance unexpended	171,387 10 3
	£	13,083,000 0 0†	£	13,083,000 0 0

* Authorised by—

	£	£
58 & 59 Vict. c. 35	1,000,000	
Less lapsed	140,000	
		860,000
59 Vict. c. 6		2,750,000
60 & 61 Vict. c. 35		654,000
62 & 63 Vict. c. 42		3,100,000
1 Edw. 7, c. 39		6,157,000
		£13,521,000

Note.—† Provided from the following sources, viz.:—

	£ s. d.	£ s. d.
From surplus income of 1895–96 set apart in the Exchequer Account under Section IV. of the Naval Works Act, 1896 (*see* House of Commons Paper, No. 80 of 1901)	4,209,472 4 4	
Less the portion, representing interest, of a sum of £382,089 14*s.* 6*d.* paid in discharge of annuity of £18,313 in 1896–97 (*see* Statement II.)	7,089 14 6	
		4,202,382 9 10
Subsequent borrowings (*see* Statement II.)	..	8,880,617 10 2
	£	13,083,000 0 0

II.—STATEMENT showing the aggregate Amount of Money borrowed and repaid, and the Securities created for borrowing the same, and discharged.

Sums issued from the Exchequer and repaid by borrowing.		Money borrowed.		Securities created.	Securities discharged.
		When borrowed.	Amount.		
	£ s. d.		£ s. d.		
Part of the sum of £860,000 issued in 1895-96	375,000 0 0	1895-96	375,000 0 0	Annuity of £18,313. First Payment 1st April, 1896; last payment 1st April, 1925.	Redeemed in the year 1896-97 by the payment of £382,089 14s. 6d. (including £7,089 14s. 6d. interest).
Part of the sum of £1,460,000 issued in 1899-1900	691,617 10 2	1st January to 31st March, 1900	691,617 10 2	Annuity of £122,255 6s. First Payment 1st Dec., 1901; last payment 1st Dec., 1924.	Nil.
Sums issued in 1900-1901	2,135,000 0 0	1st April to 31st December, 1900	1,355,000 0 0		
		1st January to 31st March, 1901	780,000 0 0	Annuity of £175,640 1s. First Payment 1st Nov., 1902; last payment 1st Nov., 1924.	
Sums issued in 1901-1902	2,906,000 0 0	1st April to 31st December, 1901	2,088,000 0 0		
		1st January to 31st March, 1902	500,000 0 0	Annuity of £204,114 19s. First Payment 1st Nov., 1903; last payment 1st Nov., 1924.	
Sums issued in 1902-1903	3,148,000 0 0	1st April to 31st December, 1902	2,718,000 0 0		
		1st January to 31st March, 1903	748,000 0 0		
			8,880,617 10 2		
		Aggregate amount borrowed . £	9,255,617 10 2		

III.—STATEMENT showing the aggregate Amount of Money expended the purposes on which that money has been expended, and the

WORKS. 1.	Total Estimated Cost. 2.	ACTUAL EXPENDITURE. Charged against Naval Votes. Period prior to inclusion in the Services provided for by the Naval Works Acts. 3.	Charged against Funds provided by the Naval Works Acts, 1895, 1896, 1897, 1899 and 1901. Period—1st April, 1895, to 31st March, 1902. 4.	In the Year ended 31st March, 1903. 5.	Total of Columns 4 and 5. 6.
	£	£ s. d.	£ s. d.	£ s. d.	£ s. d.
(a) Enclosure and Defence of Harbours:					
Gibraltar*	1,239,000	24,148 0 4	1,021,531 15 9	105,042 16 2	1,126,574 11 11
Gibraltar, Commercial Mole	669,000†	...	233,733 19 3	178,054 0 10	411,788 0 1
Portland	650,000§	...	465,012 9 5	69,373 3 2	534,385 12 7
Dover	3,500,000	...	1,022,370 8 9	448,455 15 10	1,470,826 4 7
Malta Breakwater	1,000,000	...	204 2 4	26,994 0 7	27,198 2 11
b) Adapting Naval Ports to present nee s of Fleet:					
Deepening Harbours and Approaches	1,100,000**	98,979 8 9	823,495 19 2	111,517 4 1	935,013 3 3
Keyham Dockyard Extension	4,175,000	349 10 2	3,808,625 16 4	564,904 0 6	2,373,529 16 10
Portsmouth Docks	372,502	101,165 12 8	271,336 5 5	...	271,336 5 5
Gibraltar Dockyard Extension	2,674,000	3,779 4 3	895,606 2 6	376,414 18 2	1,272,021 0 8
Hong Kong Dockyard Extension	1,275,500	...	193,877 6 10	215,381 6 3	409,258 13 1
Colombo Dock	159,000	...	50,250 0 0	25,250 0 0	75,500 0 0
Pembroke Jetty, &c.	130,300	703 15 5	81,797 11 9	80 15 11	81,878 7 8
Portsmouth, widening Caisson	40,469	271 7 2	40,194 4 3	...	40,194 4 3
Haulbowline improvements	63,000	9,577 5 6	52,633 3 6	389 11 5	53,022 14 11
Chatham Dock	450,000	...	121,722 3 3	154,419 18 4	276,142 1 7
Malta Dockyard Extension	1,250,000	...	177,782 4 11	153,659 16 1	331,442 1 0
Bermuda Dockyard Extension	700,000	...	214,274 15 0	96,960 3 2	311,234 18 2
Simon's Bay Dockyard Extension, &c.	2,500,000††	...	38,512 3 9	10,910 6 1	49,422 9 10
Coaling facilities	1,000,000	...	3,625 3 6	182,344 9 2	185,969 12 8
(c) Naval Barracks, &c.:					
Chatham Naval Barracks	445,000	2,845 10 10	382,600 14 2	38,581 3 7	421,181 17 9
Naval Barracks for Medway Gunnery School	220,000	...	1,057 6 4	711 4 10	1,768 11 2
Portsmouth Naval Barracks	670,000	...	435,831 8 6	85,442 18 6	521,274 6 8
Keyham Naval Barracks	230,000	...	157,675 13 3	26,514 16 6	184,190 9 9
Chatham Naval Hospital	379,000	...	168,462 19 11	82,015 3 6	250,478 3 5
Walmer Marine Depot	17,658	...	17,657 17 2	...	17,657 17 2
Keyham Engineers' College	23,298	...	23,297 14 4	...	23,297 14 4
"Britannia" R.N. College	315,000	...	140,890 9 0	56,492 8 8	197,382 17 8
Magazines	870,000§§	...	455,602 2 4	96,448 4 10	552,050 7 2
Haslar Hospital Extension	68,500	...	66,796 19 2	927 14 4	67,724 13 6
Haulbowline Zymotic Hospital	12,463	...	12,867 9 9	*Cr.* 11 17 0	12,855 12 9
(d) Superintendence and Miscellaneous Charges	1,303,074	...	334,269 5 5	90,742 11 7	425,011 17 0
GRAND TOTAL . £	27,501,864	241,819 15 1	9,713,595 15 0	3,198,016 14 9	12,911,612 9 9

* This work has had the benefit of the use of a dredger, purchased out of voted moneys and valued at £16,656.

† The total estimated cost of the Commercial Mole is £700,000, including £31,000 for superintendence under item (*d*). Four-sevenths of this sum are to be repaid by the colony of Gibraltar in the form of an annuity of £14,000 per annum for 57 years from the opening of the Mole, to be credited as an appropriation in aid of Navy Vote 10.

§ An expenditure of £40,543 was incurred during 1893–94 and 1894–95 in erecting dolphins on the line of the breakwater, and was charged to Navy Vote 10 in those years. This is in addition to the Estimate of £650,000.

** Exclusive of the cost of dredging plant purchased prior to 31st March, 1895.

†† An expenditure of £8,212 1*s.* 4*d.* was incurred during 1896–97 to 1898–99 on the preliminary survey for this work, and was charged to Navy Vote 10 in those years. This is in addition to the Estimate of £2,500,000.

§§ An expenditure of £31,539 6*s.* was incurred on magazines at Gibraltar and Malta during 1894-95 and 1895–96, and was charged to Navy Vote 10 in those years. This is in addition to the Estimate of £870,000.

Note.—Included in this account is a sum of £120 paid in compensation for cancellation of a contract in connection with the electric lighting of Chatham Naval Barracks. Also a sum of £11 19*s.* 1*d.* irrecoverable from a Temporary Assistant Civil Engineer, late of Hong Kong, who was discharged, services no longer required.

for any purpose of the Naval Works Acts of 1895, 1896, 1897, 1899, and 1901, balance (if any) of the sums authorised to be issued for any such purpose.

Aggregate Expenditure to 31st March, 1903. Total of Columns 3 and 6.	Amounts authorised to be expended out of the Funds provided by the Naval Works Acts, 1895, 1896, 1897, 1899, and 1901, as revised by the Act of 1901 (for details *see* explanatory Statement A. attached).	Expenditure charged against the Amounts authorised (as per Column 6).	Balance. Amounts authorised in excess of Expenditure.	Balance. Expenditure in excess of Amounts authorised.	Works.
7.	8.	9.	10.	11.	12.
£ *s.* *d.*	£	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	
					(*a*) Enclosure and Defence of Harbours:
1,150,722 12 3	1,134,236	1,126,574 11 11	7,661 8 1	...	Gibraltar.
411,788 0 1	439,688	411,788 0 1	27,899 19 11	...	Gibraltar, Commercial Mole.
534,385 12 7	543,411	534,385 12 7	9,025 7 5	...	Portland.
1,470,826 4 7	1,273,090	1,470,826 4 7	...	197,736 4 7	Dover.
27,198 2 11	50,000	27,198 2 11	22,801 17 1	...	Malta Breakwater.
					(*b*) Adapting Naval Ports to present needs of Fleet:
1,033,992 12 0	986,442	935,013 3 3	51,428 16 9	...	Deepening Harbours and Approaches.
2,373,879 7 0	2,350,263	2,373,529 16 10	...	23,266 16 10	Keyham Dockyard Extension.
372,501 18 1	271,336	271,336 5 5	...	5 5	Portsmouth Docks.
1,275,800 4 11	1,055,613	1,272,021 0 8	...	216,408 0 8	Gibraltar Dockyard Extension.
409,258 13 1	240,516	409,258 13 1	...	168,742 13 1	Hong Kong Dockyard Extension.
75,500 0 0	108,000	75,500 0 0	32,500 0 0	...	Colombo Dock.
82,582 3 1	127,035	81,878 7 8	45,156 12 4	...	Pembroke Jetty, &c.
40,465 11 5	40,198	40,194 4 3	3 15 9	...	Portsmouth, widening Caisson.
62,600 0 5	53,423	53.022 14 11	400 5 1	...	Haulbowline improvements.
276,142 1 7	204,552	276,142 1 7	...	71,590 1 7	Chatham Dock.
331,442 1 0	536,492	331,442 1 0	205,049 19 0	...	Malta Dockyard Extension.
311,234 18 2	426,227	311,234 18 2	114,992 1 10	...	Bermuda Dockyard Extension.
49,422 9 10	235,000	49,422 9 10	185,577 10 2	...	Simon's Bay Dockyard Extension, &c.
185,969 12 8	500,000	185,969 12 8	314,030 7 4	...	Coaling facilities.
					(*c*) Naval Barracks, &c.:
424,027 8 7	429,736	421,181 17 9	8,554 2 3	...	Chatham Naval Barracks.
1,768 11 2	51,057	1,768 11 2	49,288 8 10	...	Naval Barracks for Medway Gunnery School.
521,274 6 8	567,574	521,274 6 8	46,299 13 4	...	Portsmouth Naval Barracks.
184,190 9 9	172,918	184,190 9 9	...	11,272 9 9	Keyham Naval Barracks.
250,478 3 5	257,330	250,478 3 5	6,851 16 7	...	Chatham Naval Hospital.
17,657 17 2	17,658	17,657 17 2	2 10	...	Walmer Marine Depôt.
23,297 14 4	23,298	23,297 14 4	5 8	...	Keyham Engineers' College.
197,382 17 8	197,210	197,382 17 8	...	172 17 8	"Britannia" R.N. College.
552,050 7 2	669,409	552,050 7 2	117,358 12 10	...	Magazines.
67,724 13 6	68,500	67,724 13 6	775 6 6	...	Haslar Hospital Extension.
12,855 12 9	12,463	12,855 12 9	...	392 12 9	Haulbowline Zymotic Hospital.
425,011 17 0	478,325	425,011 17 0	53,313 3 0	...	(*d*) Superintendence and Miscellaneous Charges.
13,153,432 4 10	13,521,000	12,911,612 9 9	1,298,969 12 7	689,582 2 4	Grand Total.

Net Surplus £609,387 10 3

Note.—In addition to the above amount, the following expenditure has been incurred in connection with the Offices of the Naval Works Loan Staff, and for supplies of Stationery:—

	£
Amount met out of Votes for Naval Services during years 1895–96 to 1902–1903 ...	5,772
,, ,, His Majesty's Office of Works ,, ...	16,544
,, ,, His Majesty's Stationery Office ,, ...	5,451
Total	27,767

Admiralty
6 February, 1904.

R. D. Awdry,
Accountant General of the Navy.

I certify that this Account has been examined under my directions, and, subject to the observations contained in the annexed Report, is correct.

D. C. Richmond,
Comptroller General of His Majesty's Exchequer, and Auditor General of Public Accounts.

Examined,
Thos. J. Purchas.

STATEMENT showing the Sums Expended in the Financial Year ended 31st March, 1903, compared with the Amounts Available for the purposes of the Naval Works Acts, 1895 to 1901, showing the Surplus or Deficit upon each Item of the Account.

Item.	Amount Available on 1st April 1902. (1.)	Actual Expenditure during Period 1st April 1902 to 31st March 1903. (2.)	Actual Expenditure compared with Amount Available. Less than Amount Available. (3.)	More than Amount Available. (4.)	Cause of Variation between Actual Expenditure and Amount Available.
(a) Enclosure and Defence of Harbours:	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Gibraltar	112,704 4 3	105,042 16 2	7,661 8 1	—	Progress of work less than anticipated.
" Commercial Mole	205,954 0 9	178,054 0 10	27,899 19 11	—	Progress of work less than anticipated.
Portland	78,398 10 7	69,373 3 2	9,025 7 3	—	Progress of work less than anticipated.
Dover	250,719 11 3	448,455 15 10	—	197,736 4 7	Progress of work greater than anticipated.
Malta Breakwater	49,795 17 8	26,994 0 7	22,801 17 1	—	Mainly due to the contract not being let until late in the year.
(b) Adapting Naval Ports to present needs of Fleet:					
Deepening Harbours and Approaches.	162,946 0 10	111,517 4 1	51,428 16 9	—	Due chiefly to delay in proceeding with the work of embanking Hoo Ness for training the River Medway, owing to the difficulty in acquiring land.
Keyham Dockyard Extension.	541,637 3 8	564,904 0 6	—	23,266 16 10	Progress of work greater than anticipated.
Portsmouth Docks	* 5 5	—	—	5 5	Work completed.
Gibraltar Dockyard Extension.	160,006 17 6	376,414 18 2	—	216,408 0 8	Progress of work greater than anticipated.
Hong Kong Dockyard Extension.	46,638 13 2	215,381 6 3	—	168,742 13 1	Progress of work greater than anticipated.
Colombo Dock	57,750 0 0	25,250 0 0	32,500 0 0	—	Progress of work not so great as anticipated. It is being carried out by the Colonial Government.
Pembroke Jetty, etc.	45,237 8 3	80 15 11	45,156 12 4	—	Owing to the slow progress made by Contractors the work was taken out of their hands and carried out departmentally. The expenditure is being charged against the Contractors with a view to recovering from them the excess cost of completion.

Portsmouth, Widening Caisson.	3 15 9	—	3 15 9	—	Work completed.
Haulbowline Improvements.	789 16 6	389 11 5	400 5 1	—	Work completed.
Chatham Dock	82,829 16 9	154,419 18 4	—	71,590 1 7	Due to more work having been done under contract than anticipated.
Malta Dockyard Extension	358,709 15 1	153,659 16 1	205,049 19 0	—	Due to slow progress on contract work.
Bermuda Dockyard Extension.	211,952 5 0	96,960 3 2	114,992 1 10	—	
Simon's Bay Dockyard Extension, etc.	196,487 16 3	10,910 6 1	185,577 10 2	—	Due chiefly to deficiency of labour.
Coaling Facilities . . .	496,374 16 6	182,344 9 2	314,030 7 4	—	Mainly due to difficulties in completing purchases of sites.
(c) Naval Barracks, etc.:					
Chatham Naval Barracks .	47,135 5 10	38,581 3 7	8,554 2 3	—	The payments to War Department were less than anticipated.
Naval Barracks for Medway Gunnery School.	49,999 13 8	711 4 10	49,288 8 10	—	The site has not yet been handed over by War Department.
Portsmouth Naval Barracks.	131,742 11 6	85,442 18 2	46,299 13 4	—	The payment to the War Department for replacements was less than anticipated.
Keyham Naval Barracks .	15,242 6 9	26,514 16 6	—	11,272 9 9	These variations are due to the difficulty of estimating the rate of progress in the present condition of the works.
Chatham Naval Hospital .	88,867 0 1	82,015 3 6	6,851 16 7	—	
Walmer Marine Depôt . .	2 10	—	2 10	—	Work completed.
Keyham Engineers' College	5 8	—	5 8	—	Work completed.
"Britannia" R.N. College	56,319 11 0	56,492 8 8	—	†172 17 8	
Magazines	213,806 17 8	96,448 4 10	117,358 12 10	—	Due chiefly to the difficulties experienced in expediting purchases of lands and formulating schemes at Chatham and Gibraltar.
Haslar Hospital Extension	1,703 0 10	927 14 4	775 6 6	—	Less work done than anticipated. The work was practically completed.
Haulbowline Zymotic Hospital.	*404 9 9	Cr. 11 17 0	—	†392 12 9	Work completed.
(d) Superintendence and Miscellaneous Charges.	144,055 14 7	90,742 11 7	53,313 3 0	—	Due to fluctuations in staff.
£	3,807,404 5 0	3,198,016 14 9	1,298,969 12 7	689,582 2 4	

Net Expenditure less than Amount available £609,387 10*s.* 3*d.*

Note.—For purposes of comparison the amount actually available for the year's service in respect of each item has been taken in the absence of any estimate of the probable amount of the year's expenditure in each case.

* The expenditure on these two items exceeded the provision by the amounts shown, and the total amount available (Column 1) is consequently reduced from £3,807,809 0*s.* 2*d.* to £3,807,404 5*s.* (*See* Columns 10 and 11, page 5, Naval Works Account, 1901-2). In the case of Haulbowline Zymotic Hospital the excess expenditure has been reduced by the credit of £11 17*s.*, as shown.

† The expenditure in excess of provision has been sanctioned by Treasury letters of 13th May, 1902, No. 7,750, and 15th July, 1902, No. 11,165.

A.—EXPLANATORY STATEMENT showing what portions of the Estimated Expenditure set out in the Naval Works Act, 1901, were intended to be met respectively out of Naval Votes, and the fund provided by that Act and the previous Naval Works Acts of 1895, 1896, 1897, and 1899.

WORKS.	Estimated Expenditure to 31st March, 1901, per total of Cols. 3 and 4 of the Naval Works Act, 1901.	Deduct: Expenditure Estimated to be met out of Naval Votes prior to inclusion in Naval Works Acts.	Net Expenditure to 31st March, 1901, Estimated to be met out of the Funds provided by the Naval Works Acts, 1895, 1896, 1897, and 1899.	Estimated Expenditure for the Years 1901–1902, and 1902–1903, as per Col. 5 of the Naval Works Act, 1901.	Total Expenditure Authorised by the Naval Works Act, 1901, to be met out of the Funds provided by the Acts of 1895, 1896, 1897, 1899, and 1901.
(a) Enclosure and Defence of Harbours:	£	£	£	£	£
Gibraltar	945,384	24,148	921,236	213,000	1,134,236
Gibraltar Commercial Mole	139,688	...	139,688	300,000	439,688
Portland	393,411	...	393,411	150,000	543,411
Dover	573,090	...	573,090	700,000	1,273,090
Malta Breakwater	...	...	...	50,000	50,000
(b) Adapting Naval Ports to present needs of Fleet:					
Deepening Harbours and Approaches	735,421	98,979	636,442	350,000	986,442
Keyham Dockyard Extension	1,298,613	350	1,298,263	1,052,000	2,350,263
Portsmouth Docks	372,502	101,166	271,336	...	271,336
Gibraltar Dockyard Extention	589,392	3,779	585,613	470,000	1,055,613
Hong Kong Dockyard Extension	90,516	...	90,516	150,000	240,516
Colombo Dock	36,000	...	36,000	72,000	108,000
Pembroke Jetty, &c.	65,539	704	64,835	62,200	127,035
Portsmouth—widening Caisson	40,469	271	40,198	...	40,198
Haulbowline Improvements	57,686	9,577	48,109	5,314	53,423
Chatham Dock	14,552	...	14,552	190,000	204,552
Malta Dockyard Extension	86,492	...	86,492	450,000	536,492
Bermuda Dockyard Extension	126,227	...	126,227	300,000	426,227
Simon's Bay Dockyard Extension	35,000	...	35,000	200,000	235,000
Coaling facilities	...	...	...	500,000	500,000
(c) Naval Barracks, &c.:					
Chatham Naval Barracks	312,582	2,846	309,736	120,000	429,736
Naval Barracks for Medway Gunnery School	1,057	...	1,057	50,000	51,057
Portsmouth Naval Barracks	332,574	...	332,574	235,000	567,574
Keyham Naval Barracks	115,918	...	115,918	57,000	172,918
Chatham Naval Hospital	87,330	...	87,330	170,000	257,330
Walmer Marine Depot	17,658	...	17,658	...	17,658
Keyham Engineers' College	23,298	...	23,298	...	23,298
"Britannia" R.N. College	97,210	...	97,210	100,000	197,210
Magazines	360,077	...	360,077	309,332	669,409
Haslar Hospital Extension	56,346	...	56,346	12,154	68,500
Haulbowline Zymotic Hospital	12,463	...	12,463	...	12,463
(d) Superintendence and Miscellaneous Charges	254,325	...	254,325	224,000	478,325
	7,270,820	241,820	7,029,000	6,492,000	13,521,000

NAVAL WORKS ACCOUNT, 1902-3.

REPORT OF THE COMPTROLLER AND AUDITOR GENERAL UPON THE ACCOUNT PREPARED UNDER THE PROVISIONS OF THE NAVAL WORKS ACTS, 1895, AND FOLLOWING YEARS.

Comparison of Total Sum Authorised and Total Expenditure to March 31, 1903.

1. The Account shows (Statement I.) that of the total sum authorised for the purposes of the Naval Works Acts, 1895 to 1901, viz., £13,521,000, a sum of £13,083,000 had been issued to the Admiralty up to March 31, 1903, leaving a balance of £438,000 available for further issues. Of the total sum issued £12,911,612 9s. 9d. had been expended on March 31, 1903, leaving an unexpected balance of £171,387 10*s*. 3*d*. Total Authorised and Expended.

These balances, amounting to £609,387 10*s*. 3*d*., agree with the "Net Surplus" shown at the foot of page 5 of the Account.

Terminable Annuity.

2. It will be seen by Statement II. that an annuity of £204,114 19*s*. 0*d*. has been created to repay the money (£3,218,000) borrowed in the calendar year 1902, being part of the sums issued for the purposes of the Acts in 1901–2 and 1902–3. The annuity was set up on November 1, 1902, and provision for the first payment, which falls due in 1903–4, has been made in the Navy Estimates for that year under Vote 10, Sub-Head Q. Annuity to repay sums borrowed.

Comparison of actual expenditure in 1902–3 *with amount available.*

3. The Statement on page 7 shows a total under-expenditure during 1902–3 as compared with the amounts available, of £1,298,969 12*s*. 7*d*., and, on the other hand, over-expenditure amounting to £689,582 2*s*. 4*d*., the result being the net surplus of £609,387 10*s*. 3d. mentioned in paragraph 1. The most noticeable items are:— Actual Expenditure in 1902–3.

Under Expenditure:	£
Malta Dockyard Extension	205,049
Bermuda Dockyard Extension	114,992
Simon's Bay Dockyard Extension, &c.	185,577
Coaling Facilities	314,030
Magazines	117,358

Over Expenditure:

Enclosure and Defence of Harbours, Dover .	197,736
Gibraltar Dockyard Extension . . .	216,408
Hong Kong Dockyard Extension . .	168,742
Chatham Dock	71,590

Compensation Charges.

Compensation at Chatham.

4. A new system of electric lighting for Chatham Naval Barracks having been adopted after work had already been begun under a different scheme, a sum of £120 was paid to a firm of contractors for cancellation of contract.

A further sum of £180 was paid to the same firm as compensation for work put in hand by them, which, had it been completed, could not have been utilised by the Admiralty in connection with the new system.

Compensation at Malta.

The expenditure for "Magazines" includes an item of £320 paid to a firm of contractors for the supply and erection of machinery at Malta, in repayment of out-of-pocket expenses incurred by them through delays for which they were not responsible.

D. C. Richmond,

Comptroller General of the Receipt and Issue of His Majesty's Exchequer, and Auditor General of Public Accounts.

Exchequer and Audit Department,
February 20, 1904.

Austria-Hungary Navy Estimates, 1903.

Ordinary Estimates.

	£	s.
Pay of officers, etc.	174,334	12
Pay of petty officers and seamen, with clothing	127,940	8
Land service	73,686	13
Sea	181,874	12
Establishments :—		
Hydrographical Office and Naval Library	2,905	0
Naval Academy	8,191	8
,, lower-grade schools	223	15
,, hospitals	8,759	12
Maintenance of the Fleet :—		
Dockyards, repairs, and *matériel*	303,731	5
New Ships and Machinery :—		
Fifth and last Vote out of a total vote of £144,916 13s. for torpedo-cruiser "Szigetvár" (C), of 2,350 tons displacement, Ersatz "Fasana"	2,575	8
Fourth Vote out of a total vote of £491,043 15s. for ram-cruiser E, of 7,300 tons displacement, Ersatz "Radetzky"	108,333	4
Third Vote out of a total vote of £725,000 for battleship A, of 10,600 tons displacement, Ersatz "Laudon"	158,333	7
Second Vote out of an approximate total vote of £725,000 for battleship B, of 10,600 tons displacement, Ersatz "Drache"	116,666	13
Ordnance, etc.	51,166	13
Miscellaneous expenses	142,691	13
Apparent total	1,461,414	3
Certain deductions	10,208	7
Real total	1,451,205	16

Extraordinary Estimates.

	£	s.
Certain expenses in connection with Naval Academy, ships' libraries, charts, etc.	1,036	13
Maintenance of the Fleet—New Ships and Machinery:—		
Second Vote out of a total vote of £187,500 for a steel floating dock .	91,666	13
Sixth and last Vote out of a total vote of £505,158 15s. for coast-defence battleship "Habsburg," of 8,340 tons displacement . .	2,500	0
Fifth Vote out of a total vote of £531,517 18s. for coast-defence battleship "Arpad," of 8,340 tons displacement	29,166	13
Fourth Vote out of a total vote of £537,708 7s. for coast-defence battleship "Babenburg," of 8,340 tons displacement . . .	158,334	0
Second Vote out of an approximate total vote of £141,666 13s. for two Danube monitors and five patrol-boats	31,250	0
Ordnance—Guns, gun-mountings, ammunition, torpedoes, submarine mines, etc.:—		
Fourth and last Vote for armament of coast-defence battleship "Habsburg"	6,666	13
Fourth and last Vote for armament of coast-defence battleship "Arpad"	23,541	13
Third Vote for armament of coast-defence battleship "Babenberg" .	41,666	13
Third Vote for armament of ram-cruiser E	29,188	13
First Vote for armament of battleship A	37,500	0
Vote for 8-mm. machine guns and revolvers	3,000	0
Votes for ammunition, etc., for "Szigetvár," "Habsburg," "Arpad," "Babenberg," "E," and for 15-cm. Q.F. guns	88,750	0
Submarine mines	2,083	7
Torpedoes and torpedo-nets	7,500	0
Workshops, buildings, and other works	25,061	13
Expenses in connection with the Guard detachment in China . .	9,499	3
Miscellaneous	1,666	13
Total	590,078	7

French Navy Estimates, 1904.

Cap. in Estimates. 1904.	Heads of Expenditure.	Credits voted for 1904.	Credits voted for 1903.
		£	£
	PERSONNEL.		
1, 2	Admiralty Office	140,778	135,134
5, 6, 7	Navy Pay	1,970,162	1,928,405
8	Inspection of Administrative Services	12,967	12,438
9, 10	Construction and Ordnance Staff	282,318	288,200
11, 13, 14	Administrative Staff, Commissariat, and Inscription Maritime	286,631	290,745
12	Medical and Religious Staff	73,013	75,920
53	Fisheries and Navigation	28,052	28,052
	LABOUR.		
	Wages—		
25	Shipbuilding; new construction; fitting for sea	481,362	481,762
27	Shipbuilding; repairs	200,674	202,061
29	Master-attendants' and Storekeepers' Departments	246,373	251,779
33	Armaments; construction of new guns	100,966	101,166
37	Armaments; repairs	70,000	70,000
43	Works	26,491	26,691
17	Victualling	33,605	33,189
19	Hospitals, &c.	16,553	14,366
	MATÉRIEL.		
	Stores and Supplies—		
3	Admiralty	9,560	9,960
26	Shipbuilding in Dockyards	1,576,000	1,600,000
31, 32	Shipbuilding by contract	1,989,600	1,964,000
28, 30	Fitting for sea; maintenance; repairs	624,000	650,788
	Carried forward	£8,169,135	£8,164,656

Cap. in Estimates, 1904.	Heads of Expenditure.	Credits voted for 1904.	Credits voted for 1903.
		£	£
	Brought forward - -	8,169,135	8,164,656
	MATÉRIEL—*continued.*		
	Stores and Supplies—*continued.*		
23, 24	Repairs, conversions, &c., in dockyards and by contract	628,480	613,480
34, 35 36, 38	Armaments; new guns and conversions; Powder, ammunition, repairs, tools, &c.	898,719	993,661
39, 40 41	Torpedoes	206,512	206,645
44	Works; new and large alterations. .	94,576	119,600
45	Ditto; deepening of the Charente .	10,000	10,000
42, 46	Ditto, supplementary for defence of military ports	667,517	605,600
47, 48	Works; repairs	65,967	63,967
4	Hydrographic Service	15,320	19,264
15	Clothing, &c.	128,839	155,014
16, 18	Victualling	809,971	811,591
20	Hospitals, &c.	77,704	77,704
49, 50	Fuel, lighting, office furniture, printing, &c.	40,484	39,485
	MISCELLANEOUS.		
21, 22	Travelling expenses, freight, allowance for lodgings, &c.	142,400	142,920
51	Charitable and subscriptions . . .	37,717	37,150
52	Pay of Reserve Officers	29,156	—
54, 55	Fisheries and Commerce (materials for protection, &c.)	13,660	13,660
56	Pensions	472,981	460,461
57	Secret Service	4,000	4,000
	Total . . .	£12,513,138	£12,538,858

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1904.—BUILDING IN DOCKYARDS.

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1904.
					£	£
Battleships . . .	République . .	Brest . .	1901	1905	1,401,359	268,448
	Démocratie . .	" . .	1903	1907	1,401,359	381,210
	Henri IV. . .	Cherbourg	1897	1904	747,985	5,465
	Suffren . . .	Brest . .	1899	1904	1,075,009	5,080
Armoured Cruisers, First-class . .	Jules Ferry . .	Cherbourg	1901	1906	1,060,225	123,042
	Léon Gambetta .	Brest . .	1901	1904	1,122,768	94,240
	Victor Hugo . .	Lorient .	1903	1906	1,118,648	211,499
	Jules Michelet .	" .	1902	1907	1,082,892	255,353
	C. 16	Brest . .	1904	1908	1,157,959	31,544
	Dupetit-Thouars .	Toulon .	1899	1904	847,522	86,977
	Condé	Lorient .	1901	1904	883,260	43,781
	Gloire	" .	1899	1904	867,453	28,290
	Marseillaise . .	Brest . .	1900	1904	808,513	24,256
	Dupleix . . .	Rochefort	1899	1904	671,939	30,094
Torpedo-gunboats and Destroyers .	Carabine . . .	Rochefort	1901	1904	60,558	1,725
	Sarbacane. . .	"	1901	1904	60,599	6,513
	Francisque . .	"	1903	1904	60,558	17,631
	Sabre	"	1903	1904	60,558	19,794
	Stylet	"	1903	1905	68,558	27,067
	Tromblon . . .	"	1904	1905	68,558	28,106
	Pierrier (ex M. 34)	"	1904	1905	68,558	23,000
	Obusier (ex M. 35)	"	1904	1906	68,558	22,082
	Mortier (ex M. 36)	"	1904	1906	68,558	22,712
	M. 38	"	1904	1906	68,558	25,440
	M. 39	"	1905	1906	68,558	13,484
First-class Torpedo-boats . .	8. S. (ex P. 96) .	Saïgon .	1901	1904	20,127	447
	9. S. (ex P. 112) .	"	1902	1904	20,127	3,801
	P. 188 . . .	"	1903	1905	20,127	6,588
	P. 189 . . .	"	1904	1906	20,127	1,160
	224 (ex P. 32) .	Cherbourg	1900	1904	17,885	920
			Carried forward . . . . £		15,067,463	1,809,749

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1904.—BUILDING IN DOCKYARDS—*continued.*

Class.	Names of Ships.	Where Building.	Date of Commencement.	Proposed Date of Completion.	Estimated Cost.	Probable Expenditure in 1904.
					£	£
			Brought	forward .	15,067,463	1,809,749
Submarines and Submersibles	Naïade . . .	Cherbourg	1902	1904	14,458	712
	Protée . . .	,,	1902	1904	14,458	664
	Perle	Toulon	1902	1904	14,458	664
	Esturgeon . .	,,	1902	1904	14,458	664
	Bonite . . .	,,	1902	1904	14,458	1,064
	Thon	,,	1902	1904	14,458	1,064
	Souffleur . . .	,,	1902	1904	14,458	1,328
	Dorade . . .	,,	1902	1904	14,458	1,328
	Lynx	Cherbourg	1902	1904	14,456	928
	Ludion . . .	,,	1902	1904	14,456	1,144
	Loutre . . .	Rochefort	1902	1904	14,456	1,192
	Castor . . .	,,	1903	1904	14,456	2,197
	Phoque . . .	,,	1903	1904	14,456	2,800
	Otarie	,,	1903	1904	14,456	5,107
	Méduse . . .	,,	1903	1905	14,456	5,358
	Oursin . . .	,,	1904	1905	14,456	5,515
	Grondin . . .	Toulon	1902	1904	14,456	2,600
	Anguille . . .	,,	1902	1904	14,456	2,600
	Alose	,,	1902	1904	14,456	2,996
	Truite . . .	,,	1902	1904	14,456	2,996
	X. (ex Q. 35) .	Cherbourg	1903	1904	29,085	5,740
	Z. (ex Q. 36) .	Rochefort	1902	1904	29,638	6,962
	Y. (ex Q. 37) .	Toulon	1902	1904	28,730	3,803
	Aigrette . . .	,,	1902	1904	27,453	12,112
	Cigogne . . .	,,	1903	1904	27,453	11,707
	Ω (ex Q, 40) . .	,,	1903	1905	51,933	29,271
	Q. 41 to Q. 74 (34 in Number)	Cherbourg (8)	1903–4	1906–7	951,221	881,996
		Toulon (10)	..	...	...	...
		Various (16)	..	...	...	...
	Total building in Dockyards, 1904			.. £	16,502,112	2,304,261

PROGRAMME OF NEW CONSTRUCTION, TO BE CONTINUED OR UNDERTAKEN IN 1904.—BUILDING BY CONTRACT.

Class.	Names of Ships.	Places of Building and Completion.	Date of Contract.	Date of Completion	Total Estimated Cost.	Expenditure proposed for 1904.
					£	£
Battleships	Patrie	La Seyne—Toulon	1901	1906	1,674,634	234,726
	Liberté	St. Nazaire—Brest	1902	1906	1,648,652	351,531
	Justice	La Seyne—Toulon	1902	1906	1,656,830	411,948
	Vérité	Bordeaux—Brest or Toulon	1902	1907	1,672,816	405,929
Armoured Cruisers First-class	Ernest Renan	St. Nazaire-Cherbourg	1903	1908	1,317,959	174,680
	Sully	La Seyne—Toulon	1899	1904	991,130	45,120
	Amiral Aube	St. Nazaire-Cherbourg	1899	1904	1,000,728	47,112
	Desaix	,, ,,	1897	1904	761,780	34,389
	Kléber	Bordeaux—Cherbourg	1897	1904	775,845	44,741
Destroyers	Arbalète	Le Havre—Cherbourg	1900	1904	73,537	3,600
	Dardo	Rouen—Cherbourg	1901	1904	67,744	10,779
	Baliste	,, ,,	1901	1904	67,744	21,465
	Mousqueton	Chalon—Toulon	1901	1904	67,784	3,341
	Arc	,, ,,	1901	1904	67,784	2,800
	Pistolet	Nantes—Lorient	1901	1904	67,979	3,280
	Bélier	,, ,,	1901	1904	67,979	9,821
	Bombarde	Le Havre—Cherbourg	1902	1904	68,384	2,000
	Claymore (ex M. 37)	,, ,,	1903	1906	69,541	25,273
First-class Torpedo Boats	278 to 294 (ex P. 97 to P. 111 and P. 113 and P. 114)	Various	1901–3	1904	326,801	173,143
	295 to 317 (ex P. 115 to P. 137)	,,	1903	1905	434,416	185,866
	318 to 367 (ex P. 139 to P. 188)	,,	1904	..	914,384	50,851
	243 (ex P. 62)	Le Havre—Cherbourg	..	..	20,461	2,000
Torpedo Scout	Libellule	,, ,,	1899	..	13,613	2,818
Total building by contract, 1904					£13,861,525	2,250,213

German Navy Estimates, 1904.

(Converted at £1 = 20·43 marks.)

Ordinary Permanent Estimates.

——	Proposed for the financial year 1904.	Granted for the financial year 1903.
	£	£
Imperial Naval Office	88,198	86,188
Observatories	17,108	16,613
Accounts	21,269	20,198
Martial Law	6,090	5,135
Divine Service and Schools	5,444	5,125
Navy Pay	1,092,977	1,023,185
Maintenance of the Fleet	1,271,258	1,172,375
Victualling	85,138	73,396
Clothing	18,481	17,509
Barrack Administration, Cashiers and Accountants	65,246	58,975
Lodging Allowance	168,282	157,273
Medical	80,634	74,679
Travelling Expenses, Freight Charges, &c.	165,198	140,520
Training Establishments	17,830	16,935
Dockyard Expenses	1,237,020	1,178,064
Ordnance and Fortification	414,267	396,823
Accountant-General's Department	34,265	32,127
Pilotage and Surveying Services	31,680	28,818
Miscellaneous Expenses	61,434	57,855
Administration of Kiau-chau Protectorate	4,406	3,515
Total of Ordinary Permanent Estimates carried to next page £	4,886,325	4,565,308

Special Ordinary Estimates.

Shipbuilding Programme for the Financial Year 1904.

For the Construction of—

	£
Battleship Braunschweig (H), 4th and final instalment . .	115,027
" Elsass (J) " . .	115,027
" Preussen (K), 3rd instalment	227,606
" Hessen (L) "	227,606
Large cruiser Roon (Ersatz Kaiser), 3rd and final instalment .	269,211
Small cruiser Hamburg (K) " . .	53,353
" Bremen (L) " . .	53,353
" Berlin (Ersatz Zieten) " . .	53,353
Alteration of battleships of the Brandenberg class, 3rd and final instalment .	26,921
Battleship M . . . . . 2nd instalment . .	296,133
" N . . . . . " . .	296,133
Large cruiser Ersatz Deutschland " . .	246,206
Small cruiser M . . . . . " . .	119,187
" Ersatz Merkur . " . .	119,187
Reconstruction of large cruiser Kaiserin Augusta, 2nd and final instalment .	73,422
" small cruiser Irene " . .	58,737
Battleship O . . . . . 1st instalment . .	127,263
" P . . . . . " . .	127,263
Large cruiser C . . . . . " . .	156,632
Small cruiser N . . . . . " . .	59,961
" Ersatz Alexandrine . " . .	59,961
" Ersatz Meteor . . " . .	59,961
Gunboat C . . . . . " . .	39,158
One Torpedo-boat-Division, 2nd and final instalment . .	119,432
One " " 1st instalment.	151,742
Other items	226,137
Total	£3,477,972

Summary.

	Proposed for the financial year 1904.	Granted for the financial year 1903.
	£	£
Ordinary Permanent Estimates	4,886,325	4,565,308
New Construction	3,477,972	3,545,031
Armaments and Torpedoes	1,434,948	1,386,499
Other items	351,706	239,886
Extraordinary Expenditure	908,957	520,313
Total . . . . . £	11,059,908	10,257,028

Italian Navy Estimates, 1904–1905.

FINANCIAL YEAR 1ST JULY, 1904, TO 30TH JUNE, 1905.

(Converted at £1 = 25 lire.)

——	Proposed for 1904–1905.	Revised Estimates,* 1903–1904.
ORDINARY EXPENDITURE—GENERAL EXPENSES.	£	£
Admiralty	61,380	58,700
Pensions	233,200	233,200
Expenditure on various services connected with the Mercantile Marine	381,373	383,213
Total £	675,953	675,113
EXPENDITURE FOR NAVAL SERVICES.	£	£
Ships fitting out, &c.	242,800	242,800
General Staff of the Navy	146,400	146,400
Corps of Constructors	54,040	54,040
Commissariat Service	33,160	32,760
Medical Service	27,600	27,600
Wages—Men	516,000	504,000
Gratuities	95,760	84,240
Assistants to Constructors and others	61,437	60,762
Accountants, &c.	59,572	59,280
Police	11,280	11,320
Telegraph Service	10,200	9,720
„ Materials	11,520	11,680
Forts—*Personnel*	14,400	14,000
Victualling	344,000	336,000
Lighting	8,280	8,280
Hospital Services	21,920	21,920
Honorary Distinctions	600	600
Fuel and Stores, for Ships in Commission	308,000	208,000
Salaries and Wages—Workshops and Fortifications	4,420	4,314
Training Establishments	12,884	13,296
Naval Academy	2,161	2,717
Scientific Services—*Personnel*	1,586	1,498
„ „ *Matériel*	10,280	10,200
Law Charges	1,280	1,280
Travelling Expenses	24,600	24,000
Transport of Materials	5,000	5,000
Carried forward £	2,029,180	1,995,707

* The figures for 1903–4 differ considerably from those given last year. Owing to the improvement in the financial condition of Italy, the Italian lire is equal in value to the gold franc, and the Estimates are converted at 25 instead of 27 lire to the £.—ED.

—	Proposed for 1904–1905.	Revised Estimates, 1903–1904.
	£	£
Brought forward	2,029,180	1,995,707
Materials for repair of existing Ships	221,520	223,200
Labour for maintenance of Hulls and Machinery	192,000	208,640
Materials for maintenance of Ships and Armaments	153,040	154,000
Guns, Torpedoes and Small Arms	88,000	88,000
Labour for construction and repair of Armaments	120,921	80,921
Works Department—Repairs	100,000	100,000
Construction and Completion of the following:— First-class Battleships: Vittorio Emanuele and Napoli (ex – B) at Castellamare and Naples; Regina Elena and Roma (ex – A) at Spezia; laying down of a new ship, Vittorio Emanuele type, at Castellamare. Armoured Cruiser: Francesco Ferruccio, at Venice. Submarine Boat: Glauco, at Venice. Four Submarine Boats: A, B, C and D. Two Torpedo Destroyers: Zeffiro and Espero. Sixteen first-class Torpedo Boats. Sundry Small Craft	848,000	896,000
Fuel and Stores, Machines, Tools, and Plant for maintenance of Ships; Materials and Labour	208,000	200,000
Total . . . £	3,960,661	3,946,468

EXTRAORDINARY EXPENDITURE.

	£	£
General Expenses and Half Pay	1,873	3,082
Expenditure on New Construction	185,512	199,337
Coast Defence and Fortifications	8,000	8,000
Torpedoes	8,000	8,000
Total . . . £	203,385	218,419

SUMMARY.

	£	£
Ordinary Expenditure—General Expenses	675,953	675,113
Expenditure for Naval Services	3,960,661	3,946,468
Extraordinary Expenditure	203,385	218,419
Depreciation of Ships in Commission	140,000	140,000
Rent of Lands occupied by Government	107,643	107,269
Grand Total . . £	5,087,642	5,087,269

Russian Navy Estimates, 1904.

(Converted at £1 = 9·6 Roubles)

Heads of Expenditure.	1904.	1903.
	£	£
Central and Ports Administration	271,328	253,904
Educational	123,459	122,948
Medical	154,812	131,920
Pay of Officers and Men	752,502	682,710
Victualling	172,426	188,845
Clothing	339,235	310,730
Expenses of Ships in Commission	2,236,525	2,227,366
Hydrographic Department	114,172	109,712
Naval Armaments	1,253,362	1,035,017
New Construction and Repairs	4,035,776	4,420,710
Admiralty Yards and Workshops	556,676	598,916
Buildings, Rents, and Repairs	509,276	645,678
Allowances for transport	98,958	92,292
Rewards and Special Grants	64,318	63,162
Miscellaneous Expenses	283,875	265,776
Works at Port Alexander III., Vladivostock, and Port Arthur	829,206	921,775
Expenditure on account of Next Year's Estimates	39,763	35,959
Total . . . . . . £	11,835,669	12,107,420*

* The Estimates for 1903 amounted to £10,876,850. The above figures represent the actual expenditure. The chief increase over the original estimate is under the head of Armaments and Shipbuilding. The original estimate was £4,213,508. The expenditure as shown above was £5,455,727.

United States Navy Estimates, 1904–5.

(*Converted at* £1 = $4·8665, *being par, as adopted by Congress.*)

Objects of Expenditure and Appropriation.	Appropriated, 1904.	Estimates, 1905.	Appropriation Bill, 1905.
	£	£	£
Pay of the Navy	3,638,363	4,073,584	3,970,840
Pay, Miscellaneous	123,292	123,292	123,292
Contingent, Navy	3,082	3,083	13,357
Emergency Fund	5,137	10,274	——
Bureau of Navigation	271,391	280,260	279,467
" Ordnance	640,297	776,062	755,513
" Equipment	1,113,450	1,335,232	1,335,257
" Yards and Docks	153,890	189,639	187,772
Public Works—			
Bureau of Yards and Docks	891,080	1,677,771	1,349,135
Guantanamo	20,549	——	——
Bureau of Navigation, including Naval Academy, Training Stations, and War College	60,978	676,282	676,282
" Ordnance	17,013	51,145	65,530
" Equipment	1,027	1,603	1,603
" Medicine and Surgery	50,344	4,110	4,110
Bureau of Medicine and Surgery	54,453	73,975	77,057
" Supplies and Accounts	1,100,170	1,069,337	1,069,337
" Construction and Repair	1,719,310	1,766,325	1,766,325
" Steam Engineering	803,020	734,183	734,183
Naval Academy	55,563	64,645	64,051
Marine Corps	774,794	782,733	783,063
Increase of Navy:—			
Submarines	102,743	——	——
Construction and Machinery	3,087,564	4,896,097	4,074,151
Armour and Armament	2,054,865	2,465,838	2,465,838
Equipment	82,195	82,195	——
Total	£16,824,570	£21,137,664	£19,796,163

The programme for the increase of the United States Navy, incorporated in the Appropriation Bill, includes the ships enumerated below.

One first-class battleship, carrying the heaviest armour and most powerful armament for a vessel of its class, upon a trial displacement of not more than 16,000 tons, to have the highest practicable speed and great radius of action. Cost:

Hull and machinery	£904,140
Armour	369,875
Armament	313,367
Equipment outfit	10,274
Total	£1,597,656

Two first-class armoured cruisers, of not more than 14,500 tons trial displacement, carrying the heaviest armour and most powerful armament for vessels of their class, to have the highest practicable speed and great radius of action. Cost, each:

Hull and machinery	£904,140
Armour	241,446
Armament	180,828
Equipment outfit	10,274
Total	£1,336,688

Three scout cruisers, of not more than 3750 tons trial displacement, carrying the most powerful ordnance of vessels of their class, to have the highest practicable speed compatible with good cruising qualities and great radius of action; probably to have turbine engines. Cost, each:

Hull and machinery	£369,875
Armament	77,057
Equipment outfit	5,137
Total	£452,069

Two colliers, to be capable of accompanying the battle fleet, to carry 5000 tons of cargo loaded, and to have a trial speed of not less than 16 knots. Total cost each, £247,610.

APPENDIX.

THE CONDITIONS OF SERVICE IN DIFFERENT NAVIES.

Edited by CARLYON BELLAIRS.

Country.	Length of Service.	
	Active Service.	Reserve.
Great Britain*	12 years.	Not compulsory, but will be in 10 years' time; inducements are offered.
France†	44 months, with 16 months on leave. The commissioned fleet in the Channel does not retain full complements. The policy fluctuates as regards the Mediterranean.	2 years in First Reserve, and 25 years in Second Reserve.
Russia	5 to 7 years. Before the war the Baltic and Black Sea fleets used to remain only four months in commission, and were then reduced to one-fourth of their complements. The intention was to keep the Asiatic fleet eight months in commission.	8 to 10 years in Reserve.
Germany	3 years.	4 years in Reserve, and then join the *Seewehr* until 40 years of age.
Italy	4 years. The fleet is kept seven months with full complement and five reduced.	8 years in Reserve, and then 7 years in Militia, but there does not appear to be any training subsequent to active service.
Austria	4 years.	5 years in First Reserve and 3 years in Second Reserve.
The United States	4 years.	?
Japan	Volunteers, 8 years. Conscripts, 4 years.	4 years. 3 years in First Reserve; 5 years in Second Reserve.

* (Great Britain). In 1903–4 25 per cent. of the men were entered for short service with the remainder of their 12 years in the Reserve. The same proposal was embodied in the Estimates of 1904–5.

† (France). In 1900 the French Naval Estimates were reduced by over a million sterling through the transfer of the French marines (employed in the colonies) to the War Department.

Approximate Numbers of the Personnel on Active Service and in Reserve.

Country.	Numbers on Active Service. Officers.	Men.
Great Britain * . .	8529	122,862 (including 19,873 marines).
The United States*.	3588	40,743 (including 7743 marines).
France	2982	49,984.
Russia (before war)†	3034	65,797.
Germany . . .	1871	33,963.
Italy	1974	25,000.
Austria	1305	11,172.
Japan (before war).	about 2100	about 35,000.

* For these two voluntary services Navies, the numbers voted for 1904–5 are used. They are the only Navies with a marine corps. In all other cases numbers actually borne are given. The number of officers given for Great Britain includes 1730 warrant officers, 505 marine officers, 812 subordinate officers, 585 naval cadets, and 149 engineer cadets. In the case of the United States Navy, 983 midshipmen and 168 clerks are included.

† Estimates 1904–5. Does not include a number of officers employed permanently in dockyards. Though the number of men is larger there is a difficulty in manning, owing to the want of skilled ratings.

Reserves.

Country.	Numbers in Reserve.	
Great Britain	In 1904–5 there were voted—	
	Officers, Royal Naval Reserve .	2,205
	Men, Royal Naval Reserve . .	29,600
	Ditto, ditto — Newfoundland, Malta, and Australasia . .	1,700
	Royal Fleet Reserve	14,600
	Pensioners	4,991
	Royal Naval Volunteers . .	6,500
	Total	59,596
United States	No Naval Reserve. (Companies of Naval Militia in various parts of country. Numbers not known.)	
France	468 officers and about 50,000 men. (Nominally the Reserve is much larger, but in the larger figures are included men who are too old or medically unfit.)	
Russia (before war)	378 reserve officers, 5114 men in the first four years of the Reserve; the remainder liable to serve are about 65,000.	
Italy	About 33,000 in the two classes of Reserve.	
Austria.	Not known, but estimated at 20,000.	
Japan (before war)	4276 in First Reserve, and 1991 in Second Reserve.	

DESCRIPTION OF NEW JAPANESE BATTLESHIP BEING BUILT BY VICKERS SONS & MAXIM, LIMITED.

Length between perpendiculars	420 feet
Breadth, moulded	78 ,,
Draft, mean	27 ,,
Displacement in tons	15,950
I.H.P.	16,000
Speed in knots	18½
Coal, normal	750
Coal, full	1800

Armament.

Four 12-in. B.L. 45 calibre guns, mounted in pairs in barbettes, forward and aft.

Four 10-in. B.L. 45 calibre guns, single mounted in barbettes on the upper deck quarters.

Twelve 6-in. Q.F. 45 calibre guns, ten mounted in an armoured battery on the main deck, and two mounted on the upper deck amidships, behind an armoured screen.

Ten 12-pdr. Q.F. guns, eight mounted on main deck, forward and aft.

Two 12-pdr. guns for landing purposes.

Three 3-pdr. Q.F. guns.

Six R.C. Maxims.

Five 18-in. submerged torpedo tubes, four on broadside and one aft.

Armour and protection.

A complete water-line belt 9 in. thick in way of the machinery and barbettes, tapered forward in thickness to 6 in., 5 in. and 3 in., and continued aft to the stern by armour 2½ in. thick. An intermediate belt, forming the base of the armoured main deck battery, and being continued forward from the aft screen bulkhead to the stem, consisting of 6-in. armour in way of the main deck battery, tapering in thickness to 5 in. and 4 in. at the forward end, the whole of this intermediate belt armour being carried to the height of the main deck. Main deck battery between the main and upper decks to be of armour 6 in. thick, extending from the main to the upper decks and connected by 6-in. screen armour to the barbettes for the 12-in. guns at either end. In way of each of the barbettes transverse waterline bulkheads of armour 2 in. thick are fitted from side to side, extending from the lower edge of the belt armour, forming a protection against raking fire.

Barbettes to 12-in. guns, 10 in. thick.

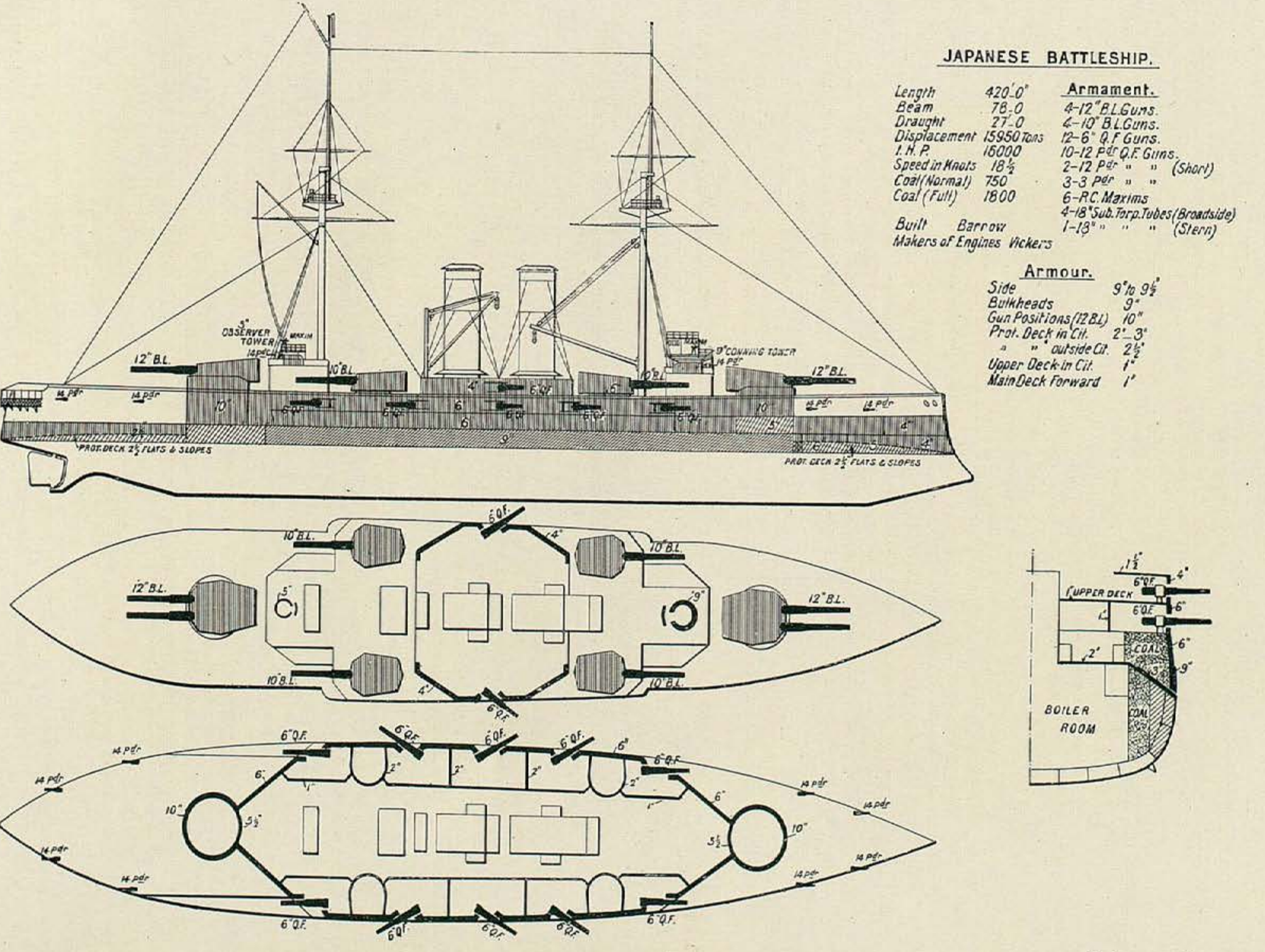
Barbettes to 10-in. guns, 6 in. thick.

Conning tower and tube, 9 in. thick.

Observer tower and tube, 5 in. thick Traverses, for isolating the 6-in. guns in the main deck battery, 2 in. thick. Longitudinal bulkheads, for main deck gun battery, 1 in. thick. Protective deck between and abreast the barbettes, 2 in. thick on the flat and 3 in. thick on the slopes. Protective deck at ends, 2½ in. thick on flats and slopes. Upper protective deck over battery, 1 in. thick. Main deck forward, 1 in. thick, to form protected roof to intermediate belt. Roof to upper deck screen, 1½ in. nickel steel.

The propelling machinery will consist of twin-screw triple expansion engines, with eight vertical cylinders of the collective power of 16,000 I.H.P., the boiler safety valve being loaded to a pressure of 230 lb. per square inch, the steam pressure being 200 lb. per square inch at the engines. The boilers will be of the Niclausse type, twenty in number, loaded to 230 lb. pressure per square inch, and arranged in three watertight compartments.

The vessel will be built in all respects to the latest requirements of the Japanese Naval Authorities, and fitted with electric cranes. Various innovations have been adopted on account of experience gained during the more recent naval engagements in the East.



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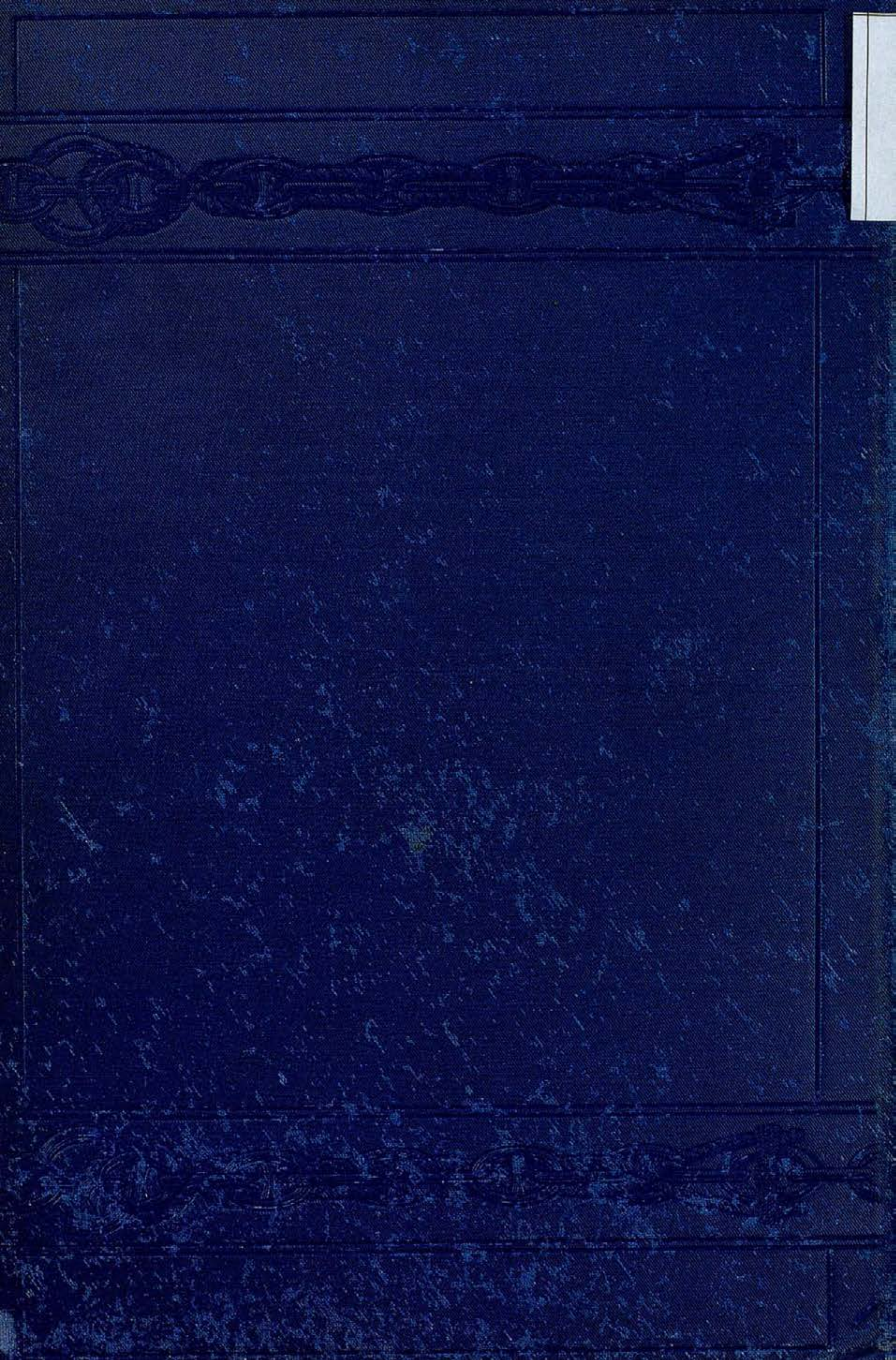
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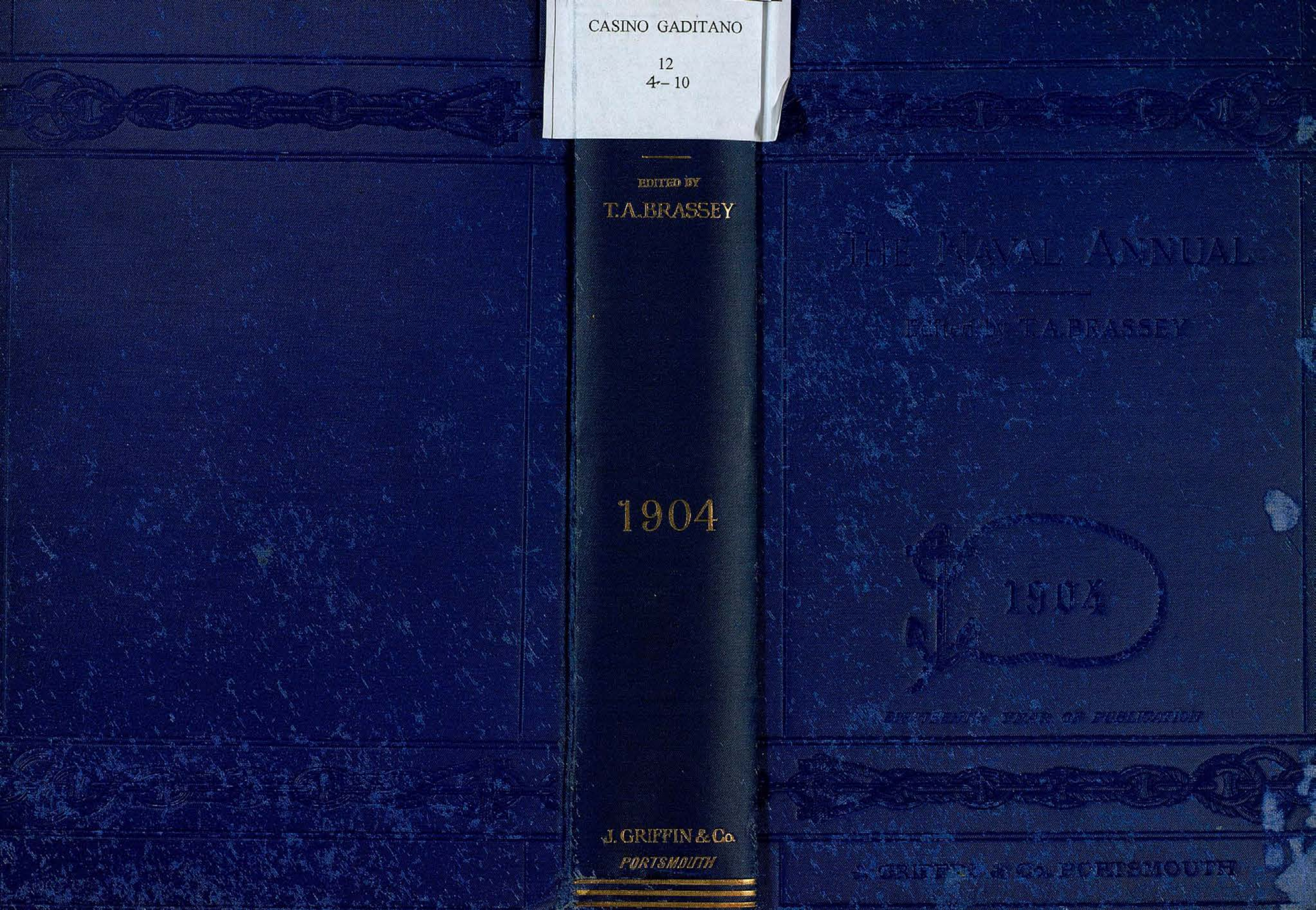
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